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# Risk of domestic accidents among under five children

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## Abstract

This is a cross sectional study. The study areas were selected by the method of two-stage sampling in urban area of Gujarat State (India). A total of 600 households were studied from both areas and thus 788 children aged less than five years were contacted and evaluated to measure the risk of domestic accidents. History of Unintentional injuries (Traffic injuries, poisoning, falls, fire & burn injuries, drowning, animal bite) and Intentional injuries: (Interpersonal violence, homicide, sexual assault, neglect & abandonment), suicide, collective violence (war) among under five children till the day of the interview was studied. The fire, electric appliances, households chemical within reach of the under five children and material which can fall on the child was also observed on the day of the survey.

## INTRODUCTION

A child's community includes a number of places- playgrounds, gardens, fields, ponds, rivers or waste dumps, but their relative importance depends on a child's way of life. For instance, millions of children throughout the world live on the street and are vulnerable to a myriad of hazards including violence and unintentional injury as well as environmental risks such as infection from scavenging on waste dumps. <sup>1</sup>

Many environmental threats to children's health are aggravated by persistent poverty, conflicts, natural and man-made disasters, and social inequity. The children worst affected are those in the developing world but there are many children in the more developed, even the richest, countries, who are also at risk. <sup>1</sup>

Today's "modern" risks result from the unsafe use of dangerous chemicals, the inadequate disposal of toxic waste and other environmental hazards, noise and industrial pollution. Unsafe chemicals in toys and household products may also harm children. "Emerging" potential environmental threats to health include global climate change, ozone depletion, contamination by persistent organic pollutants and chemicals and other hazards, and emerging diseases. <sup>1</sup>

Children are often exposed not just to one risk factor at a time but to several simultaneously. They frequently live in unsafe and crowded settlements, in underserved rural areas

or in slums on the edges of cities, which lack access to basic services such as water and sanitation, electricity, or health care. They are likely to be exposed to industrial and vehicle pollution as well as to indoor air pollution and to unsafe chemicals. Children are also likely to suffer from unintentional injuries (accidents) and poisonings associated with unsafe housing and consumer products. They are more likely to be undernourished, causing them to be more vulnerable to environmental threats. <sup>1</sup>

The biggest threats to children's health lurk in the very places that should be safest-home, school and community. Every year over 5 million children ages 0 to 14 die, mainly in the developing world, from diseases related to their environments-the places where they live, learn and play. <sup>1</sup>

Strategies have been developed to combat these threats to children's health. They need to be implemented on a global and national scale. So the World Health Day-2003 was dedicated to "Healthy Environment for Children". In September 2002, WHO launched the Healthy Environment for Children Initiative. They are now working with different groups around the world to turn this initiative into a vibrant, global alliance which will be capable of mobilizing local support and intervening to make children's lives healthier where they live, learn and play. <sup>1</sup>

That is why; this study was carried out to assess the domestic accidents among under five children in Surat city so that suitable recommendations can be suggested for prevention of morbidity and mortality among them.

**MATERIALS AND METHOD**

This cross sectional study was undertaken to assess the relationship of domestic environmental factors over the health of under five children and to make recommendations for prevention of morbidity & mortality among them in Surat city. The study areas were selected by the technique of two-stage sampling. Thus, an urban slum and a Middle-income group areas were selected which were under Khatodara Urban Health Center. The information was collected using interview technique by house to house survey. Study period was from January to May 2005. A sample size of 600 families was estimated, that is why 300 households from urban slum and 300 households from middle income group were surveyed. Thus, an urban slum (Morarji Vasahat) and a middle-income group (Harinagar-3) areas were selected. The information was collected using interview technique. Study period was from January to May 2005. Sample size was 600 families- 300 from urban slum and 300 from middle income group. Data entry and analysis was undertaken by Epi\_info version 6.04 software.

**RESULTS**

Nearly two third of the boys (64.1 %) from MIG area were at risk of electric appliances within reach in their home as compared to 23.9 % in urban slum area. In the same way girls (54.7 %) of the MIG area were higher at risk of exposure to electric appliances as they were within reach in comparison to 17.6 % girls of the urban slum area.

Three fifth boys (61.0 %) were found at risk of household chemical being within reach in urban slum area as compared to about one fourth boys (26.6 %) were at same risk in MIG area. Similarly more girls (63.5 %) from the urban slum area were at risk as household chemical was within their reach in comparison to girls (31.1 %) of the MIG area.

It was shocking to observe that an overwhelming majority (92.5% boys & 91 % girls) in the Urban slum area were exposed to fire as it was within reach in their homes and was generally considered safe by the parents. The risk of material / item falling (57.7% boys & 53.2% girls) was found only in Urban slum area which highlighted the more hazardous nature of domestic environment as compared to MIG area. The thought that socio economic status affects safety of children is very sobering. (Table-1)

Characteristics of domestic environment were studied. There was only one pucca (cement concrete) house in urban slum (Morarji vasahat) of Surat city and most of the houses

(99.3%) were pucca in another locality “Middle Income Group”. Kerosene as fuel was used by 65.3% households in urban slum whereas 92.0% families were using cooking gas in MIG area.

**Figure 1**

Table 1: Sex specific exposures to different type of risks among in their homes.

Type of risks	No. of U 5 Children who are exposed to different risks of home accidents.			
	Urban slum (Morarji Vasahat) Boys n=213 Girls n= 221		Middle income group (Harinagar-3) Boys n=192 Girls n=162	
	No	PP	No	PP
Presence of fire within reach of U 5 children				
Boys	197	(92.5)	24	(12.5)
Girls	201	(91.0)	22	(13.7)
Presence of electric appliances within reach of U 5 children				
Boys	51	(23.9)	123	(64.1)
Girls	39	(17.6)	88	(54.7)
Presence of household chemicals within reach of U 5 children				
Boys	130	(61.0)	51	(26.6)
Girls	140	(63.5)	50	(31.1)
Presence of risk of material / item falling on U 5 children				
Boys	123	(57.7)	Nil	Nil
Girls	117	(53.2)	Nil	Nil

The illiterate mothers did not take precaution from household chemicals in urban slum area because two third under five children (64.5%) were within its reach. It was also observed that the under five children whose mothers were either illiterate or educated up to primary standard were more at risk of different type of home accidents as compared to educated mother in urban slum. The situations of fire within reach showed decreasing trends with increasing educational status of mother in both the areas and a similar trend was observed for exposure to household chemical within reach in the Urban slum area bur education had no effect in the MIG area. However, a reverse situation was observed for exposure to electrical appliances. It was increasing with the increase in the educational level and was more frequent in the MIG area. This may be related to the purchasing power of to better economic status in MIG area. The higher education made them more aware about the electric appliance. Leading to procurement of electric appliances. (Table-2)

**Figure 2**

Table 2: Different risks of home accidents among according to the education of their mother.

Educational status of mother	No. of U 5 children who are exposed to different risks of home accidents.									
	Urban slum (Morari Vasahat)					Middle income group (Harinagar-3)				
	n	Fire within reach	Electric appliances within reach	Household chemical within reach	Material / item fall on child	n	Fire within reach	Electric appliances within reach	Household chemical within reach	Material / item fall on child
Illiterate	265	257 (97.0)	54 (20.4)	171 (64.5)	164 (61.9)	7	2 (28.6)	4 (57.1)	2 (28.6)	Nil
Primary	95	80 (84.2)	17 (17.9)	61 (64.2)	37 (38.9)	39	5 (12.8)	19 (48.7)	12 (30.8)	Nil
SSC & HSC*	70	59 (84.3)	16 (22.9)	37 (52.8)	37 (52.8)	199	29 (14.6)	113 (56.8)	60 (30.2)	Nil
Graduate & Post-graduate	4	2 (50.0)	3 (75.0)	1 (25.0)	2 (50.0)	109	10 (9.2)	75 (68.8)	27 (24.8)	Nil

\*SSC= Secondary School Certificate, HSC= Higher Secondary Certificate. (Figures in parenthesis are raw wise percentage)

About three fifth boys (63.4 %) suffered from accident / injury in their life till the day of survey in urban slum area as compared to 47.4 % boys in MIG area. Proportion of accident / injury was higher in both boys (63.4%) & girls (56.7 %) in urban slum area in comparison to the boys (47.4%) & girls (47.5 %) of MIG area. However, in the Urban slum area boys (63.4%) had a larger percentage of injuries as compared to girls (56.7%).

It was very satisfying to note that no intentional injuries to under five children were found in this study. Analysis of data revealed that fall from height was the commonest accident / injury among under five children and was almost similar in both the areas. Certain form of injury / accidents like electric shock, dog bite and foreign body ingestion were only recorded in the urban slum area and was not found in MIG area. On the contrary two cases of poisoning were found in MIG area and none from slum area. (Table 3)

**DISCUSSION**

Injuries are commonly classified based on “intentionality”. Most road traffic injuries, poisoning, falls, fire and burn injuries, and drowning are unintentional. Intentional injuries include interpersonal violence (homicide, sexual assault, neglect and abandonment, and other maltreatment), suicide, and collective violence (war). In urban areas, most injuries are traffic related appliances, falls or poisonings resulting from household chemicals and pharmaceuticals ingested by small children. 2

The environmental factors leading to injuries are often associated with other environmental health risks. For example, home and school construction and furnishing materials can lead to unintentional injuries, and poisoning

may result from exposure to chemicals unsafely used or stored. International injuries resulting from child maltreatment are associated with physical and cognitive deficits in the abused infants,

poor parenting skills, material conflict and lack of social support systems for families.

**Figure 3**

Table 3: Cumulative incidence rate of different types of accidents / injuries recorded among till the date of interview. (Figure in parenthesis are percentage)

Types of accidents / injuries	No. of U 5 Children with h/o of accidents / injuries.			
	Urban slum (Morari Vasahat)		Middle income group (Harinagar-3)	
	Boys (n=213)	Girls (n=221)	Boys (n=192)	Girls (n=162)
Falls	102 (47.9)	108 (48.9)	68 (35.4)	68 (41.9)
Sharp cut	13 (6.1)	6 (2.7)	15 (7.8)	5 (3.1)
Burn / Scalds	11 (2.7)	7 (3.2)	3 (1.6)	3 (1.9)
Animal bite	5 (3.7)	2 (0.9)	Nil	Nil
Road traffic	2 (0.9)	1 (0.4)	3 (1.6)	1 (0.6)
Foreign body ingestion	2 (0.9)	0 (0.0)	Nil	Nil
Poisoning	Nil	Nil	2 (1.0)	Nil
Electric shock	Nil	1 (0.4)	Nil	Nil

Urban transport, land use patterns, and recreation areas are linked to road traffic injuries, as well as to exposure to air pollution and noise. Workplaces pose specific physical and chemical risks to adolescent workers, whose vulnerability is increased by unsafe behaviours. 2

In the current study, data were collected to measure different type of risk among under five children in their homes viz. presence of fire within reach of under five children, presence of electric appliances within reach of under five children, presence of household chemicals within reach of under five children, and presence of material / item falling on under five children.

However, Masson et al 3 in the study of Injuries in a Problematic Socioeconomic Context among Reunion Indian Ocean noted one year incidence of injury related hospital admission was 1145.7 per one Lakh and 714.1 per one lakh among under five boys and girls respectively. In the same way, 8.8 per one lakh and 18.0 per one lakh injury related death among under five boys and girls respectively. He also noted under five year incidence of injury (/100 000), by falls (349.4), Poisoning (204.3) Traffic accidents (69.6), Stuck or cut by object (119.9), Burns (100.7), non-intentional (932.7) and Homicides or assaults (8.9).

Mukerji et al <sup>4</sup> in the study of Epidemiology of paediatric burns in Indore. Hospitalised paediatric burns constituted 13.5% of total burn accidents. These children were categorised into three groups, the infants and toddlers (0-2 years), early childhood (>2-6 years) and late childhood (>6-14 years). In the first two groups scalding was the predominant cause of injury while in late childhood there were many more flame and electric burns. Males were mainly affected.

Risks of home accidents among under five children were also studied. Most of children in urban slum were exposed to fire accidents because the fire was within reach in urban slum. On the other hand the under five children of MIG area were more frequently exposed to electric appliances as compare to urban slum. The risk of falling of a material or item was very common in under five children in urban slum, which was, nil in MIG area.

Further analysis of data revealed that fire was within reach among more than three fourth of under five children. For each age group in urban slum area, the same range from 8.9% to 17.8%. In the same way the risk of electric appliances being within reach in MIG area increased with increase in age group.

Sharma et al <sup>5</sup> in his study of 'At Risk' Under Five Children in rural area (Pachhad block of District Sirmour, H.P.) found that majority of 'at risk' children were found in the age group of 25-36 months. Higher prevalence of 'at risk' children in this age group may be due to the fact that in India, pregnancies occur too close and by the time, the child is 2 year old, mother has another sibling in her lap. So the elder sibling is neglected and left in the care of some substitute.

The illiterate mothers did not take precaution from household chemicals in urban slum because two third under five children (64.5%) were within its reach. It was also observed that the under five children whose mothers were either illiterate or educate up to primary standard were more at risk of different type of home accidents as compare to educated mother in urban slum. In MIG area the effect of education could not be seen for the risk of electric appliances and household chemicals being within reach.

Sharma et al <sup>5</sup> in his study of 'At Risk' Under Five Children in rural area (Pachhad block of District Sirmour, H.P.) also recorded the educational status of mother of 'At Risk' children. 89.3% mothers were illiterate, 66.5% study up to primary, 50% up to middle, 45.5% up to higher and 55.1%

above higher. Literacy is an index of awareness and knowledge and plays an important role in detecting the behavior of a person towards health and disease. Educated people are relatively more health conscious than uneducated. So as the literacy status of parents' increases, the prevalence of 'at risk' factors decreases.

Analysis of data revealed that fall was the commonest accident / injury among under five children and was almost similar in both the areas. Certain form of injury / accidents like electric shock, dog bite and foreign body ingestion were only recorded in the urban slum area and was not found in MIG area. On the contrary two cases of poisoning were found in MIG area and none from slum area.

Macgregor <sup>6</sup> in the study of Injuries associated with falls from beds reviewed by all children attending with an injury sustained due to a fall from a bed or top bunk over five months at accident and emergency (A&E) department in the Royal Aberdeen Children's Hospital (U.K). 85 children were identified, a majority of whom were reported to have fallen out of bed while sleeping. 25 sustained a fracture, 27 a head injury, 12 a laceration requiring treatment, and 21 sustained a soft tissue injury to a limb. Fourteen (16%) required admission. 66 (78%) of the injuries occurred in children under the age of 6 years. His studies showed a higher incidence of significant injury than previously reported, and demonstrate the inadvisability of letting children under the age of 6 years sleep in upper bunks. In an attempt to make parents more aware of the risks it is recommended that these dangers should be brought to public attention.

Ozdemir et al <sup>7</sup> in the study of Childhood foreign body aspiration recorded that 10 children (six boys, four girls) with a diagnosis of foreign body aspiration (FBA) amongst 19,951 cases that underwent autopsy between the years 1996-2002. Eight of the children were under 2 years old. All the incidents took place at home. The legal instructions, which regulate the standards of toy materials, came into force at the end of 2003. Even though the legal instructions regulating the size and consistency of toys are very important to prevent FBA, we believe that the education of the parents and carers in the prevention of food aspiration is of greater importance.

Macgregor et al <sup>8</sup> in the study of Fingertip trauma in children from doors who were attending accident and emergency (A&E) department in the Royal Aberdeen Children's Hospital (U.K). Fingertip and nail bed trauma caused by doors is common in children, occurring when fingers are

either shut in the door itself or are trapped in the hinge as the door is closed. One hundred and eighty eight children, 2% of all attendances in this period, had sustained such trauma, 39% of these occurring in children under four years of age. One hundred and forty seven children (75%) had sustained relatively minor soft-tissue injury to the finger, However the remaining forty seven (25%) of the injuries sustained were more serious e.g. Avulsion of the nail from the nail bed or amputation of part of the fingertip and 29 (15%) of all the cases required a general anaesthetic for exploration, cleaning and repair. The incidence of significant injury was higher than expected and caused considerable distress to both the children and their parents. Though in this study none of the parent brought into the notice of the investigator about any accident of finger tip trauma in children however it is suggested that home safety protocols should feature advice on how to avoid these injuries.

In this study, cases of burn / scalds were found in both the study area. (Table 3)

The girls revealed more burn / scald injuries as compared to boys in urban slum. The cases of scalds were hot tea and boiling water and burn due to the fire of chula or hot vessels in kitchen.

Sorensen et al <sup>9</sup>, in the study of Scalding injuries in children who were attending burn department in the hospital of Brannskadeavsnittet, Haukeland Sykehus, Bergen. Investigator recorded that during the years 1989-91, 88 children were hospitalized in the Burn Unit. 60 children, of whom 57 were under five years of age, suffered from scalds. All of the injuries happened at home and nearly 60% of the children received immediate treatment with cold water. The causes of the scalds were hot tap water, tea, coffee or boiling water. In order to reduce scalds from hot tap water, legislation should be considered which would limit the temperature of such water to maximum 60 degrees C. Health personnel who meet these problems should present the above information to the politicians.

In this study two cases of poisoning (Table 3) were reported from MIG area. They were the cases of food poisoning.

Sommerfelt <sup>10</sup> in the study of Accidental poisoning in children admitted to the Pediatric Clinic, Haukeland Hospital, from 1958 until 1986 for accidental poisoning. Drugs was the most frequent poisoning agent (49%), followed by household agents (22%), different agents (20%)

and plants/mushrooms (9%). 89% of the children were under five years of age, 57% were boys. Most of the increase referred to poisoning from plants, tobacco and hydrocarbon products. In the British law, it would have been illegal to sell without special child-resistant packaging.

Basu et al <sup>11</sup> in the study of Epidemiological aspects of acute childhood poisoning among patients attending a hospital National Medical College Kolkata revealed 3.6% of total paediatric admissions were due to poisoning. Majority of the cases included oral/chemical poisoning. Kerosene was the commonest among all poisoning. Most of the cases were accidental.

In this study only one event of electrical shock was reported in urban slum to a girl. No death was reported due to electric shock.

Brokenshire et al <sup>12</sup> in their study on Deaths from electricity recorded 95 fatalities from electrical injuries. 89 were accidental, 4 were suicides and 2 occurred during autoerotic electrical stimulation. 49 of the accidental fatalities occurred at work, 28 in the home and 12 in the course of outside recreational activities. Nine fatalities involved children under the age of five years who contacted inadequately protected wires.

Gaillard et al <sup>13</sup> their study of Emergency medical care and severe home accidents in children recorded. Fifty-five per cent (60% in boys) of household injuries occurred in preschool-age children. Half these injuries (burns excluded) were physical injuries (66% in boys). Forty per cent of household injuries (n = 251) were caused by a fall, from over one meter in half the cases. Household physical injuries occurred mainly in children under five, whereas out-of-home childhood injuries were more common after five years of age.

The findings of this study may be utilised as based line information in the latter period.

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