ADVANCING CHILD SAFETY IN INDIA:
Implementation is the key

A Report by NIMHANS

NATIONAL INSTITUTE OF MENTAL HEALTH & NEURO SCIENCES

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Message

NATIONAL INSTITUTE OF MENTAL HEALTH & NEURO SCIENCES
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Dr. B.N. Gangadhar
MBBS, MD, DSc (Yoga), FAMS
Director
Sr. Professor of Psychiatry

Message

With changing health scenario, India is facing an epidemic of injuries since the last two decades. Nearly 15% of all deaths are due to injuries and a quarter of these occur among children. Official reports and independent research indicate that road traffic injuries, drowning, falls, burns and poisoning are leading causes of unintentional injuries and deaths among children. These numbers are expected to increase in coming years due to globalization, industrialization, urbanization and motorization.

There is a need for coordinated response from all concerned stakeholder's to protect our children and reduce the number of injuries and deaths. Safety of every child - at home, school, public places or recreational centers should be a priority. I am happy that the Department of Epidemiology, NIMHANS and WHO collaborating centre for Injury prevention and safety promotion, in collaboration with Underwriters Laboratories, has brought out this much needed comprehensive report titled "Advancing Child Safety in India: Implementation is the Key". The report reiterates that effective implementation of child-related policies and programmes that holds the key to reduce child injury deaths and promote overall safety of children in India.

I strongly hope that the findings from this report will catalyze action on a multi-sectoral platform to plan and implement evidence-based interventions. This report aimed at policy/programme implementation concerning safety of children will be useful to all individuals aspiring to keep our children safe.

My best wishes to the entire team!

Prof. B.N. Gangadhar
Director

Message

Underwriters Laboratories is a non-profit organization that is committed to making the world a safer, more secure and sustainable place. Over the years, we have built long-standing partnerships with various Government bodies, research organizations and leading academic institutions to conduct rigorous independent research, share knowledge through safety education and public outreach initiatives and develop standards to ensure safer environments across domains. In India, a large part of our focus has been on furthering education and awareness about best practices in safety.

Our latest initiative in this regard has been a comprehensive research project on 'Child Injury Prevention'. Undertaken in association with the National Institute of Mental Health & Neuro Sciences (NIMHANS) - a leading academic institution, this research aims to not only sensitize various audiences about the pressing need to implement safety practices in and around schools, but also intends to identify measures to implement the same. This report is designed to offer an in-depth view into the current scenario with regard to child injuries in school environments as well as educate the reader about the many preventive measures that parents, students and school authorities can resort to, in order to minimize injuries among children. While this report is a consolidated document comprising data mined from various national and international sources, on-ground research results and insights, and recommendations on safety practices; several versions of the same (infographics, safety toolkits, etc.) will be disseminated in the course of the next few months to schools, policy makers, and others to ensure that the learning gained by virtue of this exercise are put into practice.

I would like to sincerely thank NIMHANS for spearheading this research, the schools that participated in this research, as well as our field teams for helping bring our vision of safer school environments to fruition.

Lakshmi Nair
Program Manager - Public Safety Mission
Underwriters Laboratories

Preface

With nearly 548 million children aged less than 18 years in India, child safety and injury prevention are a vital investment. Unintentional injuries accounted for nearly 7.2% of all causes of deaths and 6.3 million DALYs among children <14 years. A renewed and increased public interest regarding injuries and safety in schools is observed in recent times. This has brought in the need to implement evidence-based comprehensive interventions to reduce injury deaths among children.

However, valid information regarding the precise number of child injury deaths, hospitalizations, disabilities and their socio-economic impact are not clearly known in India due to a lack of injury surveillance, trauma registries and information systems. Information regarding safety levels across schools, homes, play sites and other areas as well as products that children use, is limited as well. The report indicates that nearly 60,445 children (0-18 years) died due to all injuries and an estimated 1.81 million were hospitalized in the year 2015. An appraisal of schools revealed that overall safety level in schools needs improvement.

The first phase of child safety and injury prevention programme is aimed at collating information from available sources regarding child injuries in India and developing a roadmap to provide the much needed direction. It aims to provide comprehensive information from a public health perspective, using information from official reports and research studies. The report also discusses issues of safety in schools and policies for child safety. The report is intended to cater to policy makers, technical professionals, students and general public, media professionals, academicians, researchers and anyone interested in ensuring safety of children.

Globally, the experience of many HICs has demonstrated a significant decline in deaths and injuries among children based on implementation and evaluation of evidence-based interventions. With the available knowhow of what works to reduce child injuries and deaths, the challenge lies in its implementation, which is the key. Ensuring child-centric injury prevention policies, institutional approaches, specific budgets, data systems and enforcement mechanisms in a cost-effective manner are the key challenges to be addressed.

This report will serve as a technical and advocacy document to provide the much needed information to all stakeholders to plan safety interventions for children in India. With concerted efforts towards universal access to education, immunization, nutrition for children over the decades, it is time for universal access to safety for children in India. Our efforts will be amply rewarded if this report can catalyze action for the safety of children in India.

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Executive Summary

A safe and healthy environment for all and for children in particular is an absolute necessity for their healthy growth and development. Children are susceptible and vulnerable due to their physical size, difficulty in risk perceptions, impulsivity and risk taking behaviors. However there is limited information regarding child injuries to plan evidence-based injury prevention interventions in India. NIMHANS and global safety science company, Underwriters laboratories has developed a national report on child injuries in India titled "Advancing child safety in India: Implementation is the Key" to help all agencies develop appropriate programmes in the coming years.

A review of available data on unintentional injuries in India based on national reports, research studies, government websites and others was conducted. In addition, in phase 1 of their programme, a safety appraisal was undertaken across 131 (public and private, aided and unaided) schools in Bengaluru and Kolar district, using a specifically developed mobile application. These schools were assessed and scored on physical infrastructure, road safety, fire safety and first aid facilities.

Furthermore, current policies for injury prevention and safety promotion in India for children was reviewed.

Some key findings of the research study are:

- Child injuries are a growing public health problem in India with nearly 5,00,000 child deaths in the last decade;
- For every intentional injury death among children, three unintentional child injury deaths are reported;
- Children account for 15% of total injury deaths;
- Every day, about 165 children die in India due to an unintentional injury. From an official report in 2015, it is estimated that 60,445 children aged 0-18 years died as a result of injuries. Out of these, 45,636 deaths were due to unintentional injuries like road crashes, burns, drowning, poisoning and others in year 2015. Officially reported number of child injury deaths were 50,371 of which 39,026 were due to unintentional injuries.
- Injury deaths were more among boys and children aged between 15-18 years (60% of all deaths). Number of deaths among children aged 0-14 years were 24,178 (40% of all deaths).
- Proportion of child injury deaths at the site of injury in rural areas (58%) were higher than urban areas (33%).
- Nearly 41% of all fatal injuries occurred on roads followed by 31% at home.
- Road crashes/accidents are the most common cause of child injury deaths in India. RTIs accounted for 37-38% of deaths among 0-14 years and 62-64% among 14-18 year old children.
- Burns and drowning accounted for 10-11% and 13-19% of all deaths, respectively.
- Falls and poisoning injuries accounted for 5-6% of all deaths among children.
- Nearly 44% of all child injury deaths occurred at site of injury, followed by 37% in hospital and 18% during transit to hospital.
- Nearly 1,800,000 children sustained one or more serious unintentional injury(ies) which required hospital care for varying periods of time.
- Half the child injury deaths can be averted with efficient trauma care systems.
- Nearly 10% of injured children experience temporary functional limitation varying from one week to several months. About 2% of children are left with permanent disability and 12% live with long term (>6 weeks) temporary disability.

Safety in schools in Bengaluru and Kolar.

- The research team developed a digitalized (android app-based) safety appraisal tool based on various existing national level guidelines and quantified safety level (%) in every school at a macro level (not based on audits).
- Overall safety in schools was observed to be 50.8% of expected levels.
- Safety level grading revealed that 48% of schools were in Grade C (safety between 50-74% of expected). Grade B were schools whose safety level (%) was between 75-90% (3.1% of schools were Grade B). Grade A schools are schools with >90% safety level (%) and only one school was categorized in Grade A.
- CCTV surveillance facility was present in nearly 81% of schools.
- Physical infrastructure in schools with respect to safety components (flooring, staircases, corridors, balconies, windows and railings in buildings and classrooms) were acceptable in majority of the schools with anti-skid floor being present in 54.2% of the schools.
- In 60% of the schools, there was an easy access to roof posing the risk for fall injuries.
- Safety levels on roads adjoining the schools (in terms of school zone signage, speed limit display, presence of speed breakers, pothole free roads, footpaths, zebra crossing, supervised lane crossing and designated dropping/pick up zones) were scored at 20.8% of expected. Only 17% of schools had roads which showed school zone signage and 11.5% had speed limits displayed. Around 43% of school buses had CCTV and 58% had GPS tracking system.
- The Supreme Court guidelines for safe commuting to and from schools are followed by 49% of the schools where the school bus facility was present.
- Fire safety in most schools was compromised as it was only 20%. Most schools did not have fire safety certificates. Evacuation plans, fire log books, fire detectors and fire alarms were present in less than 8% of the schools. Most schools (94%) had fire extinguishers.
- A school safety committee was present in 64.9% of schools however, not even one fourth of the schools had school safety guidelines. In 52.7% of the schools, the school safety committee framed by the schools have parents as members of the committee.
- Majority of the schools (90%) didn't have any injury-related health records.

Safety policies and programmes.

Review revealed that various policies and legislations to promote safety and prevent injuries among children are present in India, but implementation challenges are several and exist to a very great extent. The existing guidelines legislations/standards need strict implementation calling for strengthening mechanisms at the local levels. These include the supreme court guidelines of safe travel to schools (1997), safety of school children in school bus as per CBSC guidelines (2017), fire and life safety guidelines as per national building code (2016), National Disaster Management Authority School Safety Policy Guidelines (2016), Guidelines for School Infrastructure and Strengthening (2014), Council for Indian School Certificate Examination (ICSE): School Safety Manual (2018), Manual on Safety and Security of Children by National Council for Protection. of Child Rights, Rashtriya Kishor Swasthya Karyakram (2014) by Ministry of Health and Family Welfare, POSCO act (2012), and the recently amended Motor vehicles amendment bill (2019) and several state directives.

Child safety is the joint responsibility of governments and its various ministries/departments, industries, schools managements, citizens and all others. Children need to be made safe in all places they are present. Implementation of existing policies, programmes and legislations is the first step and key to reduce child injuries in India. It's time to act.

List of abbreviations

BBMP:	Bruhat Bengaluru Mahanagara Paalike
BMTC:	Bangalore Metropolitan Transport Corporation
BIS:	Bureau of Indian Standards
BISP:	Bangalore Injury Surveillance Project
BRISP:	Bangalore Road Injury Surveillance Project
CBSE:	Central Board of Secondary Education
CISCE:	Council for Indian School Certificate Examination
DALYs:	Disability Adjusted Life Years
ER:	Emergency room
GBD:	Global Burden of Diseases
HCFs:	Health Care Facilities
HICs:	High Income Countries
ICD:	International Classification of Diseases
ICMR:	Indian Council for Medical Research
IHME:	Institute for Health Metrics and Evaluation
IPC:	Indian Penal Code
LMICs:	Low and Middle Income Countries
MCCD:	Medical Certification of Cause of Death
MCH:	Maternal and Child Health
MDS:	Million Death Study
MHRD:	Ministry of Human Resource and Development
MOSPI:	Ministry of statistics and program implementation
MoRTH:	Ministry of Road Transport and Highways
MOU:	Memorandum Of Understanding
NBC:	National Building Code
NCDs:	Non Communicable Diseases
NCPCR:	National Council for Protecting Child Rights
NCRB:	National Crime Records Bureau
NDMA:	National Disaster Management Authority
NIMHANS:	National Institute of Mental Health and Neurosciences
POSCO:	Protection of Children from Sexual Offences
RKSK:	Rashtriya Kishor Swasthya Karyakram
RMSA:	Rashtriya Madhyamik Siksha Abhiyan
RTE:	Right to Education
RTI:	Road Traffic Injury
SCPCR:	State Commissions for the Protection of Child Rights
SOP:	Standard Operating Procedure
TBI:	Traumatic Brain Injury
UNICEF:	United Nations International Children's Emergency Fund
WHO:	World Health Organization

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Section 1: Child safety scenario

1. Introduction

1.1 India over the years

Since independence, India has made giant strides in education, health, welfare and living standards. The population of the country is at 1.36 billion, and is estimated to rise to 1.37 billion by year 2019[1]. India is witnessing significant changes due to globalization, industrialization and urbanization. In addition, the macro and micro policies of successive governments have contributed further to the economic growth of the country. In the year 2015, the number of registered industries was at 2.31 million[2] and there are nearly 10 million registered companies as of 2019. Census 2011[3] revealed that 31.1% of the Indian population resides in urban areas[4], a 12.5% increase from 2001[5]. This number is likely to reach 473 million by year 2021[5]. The number of vehicles tripled between 2001 and 2013, adding nearly 1,22,609,000 vehicles to our roads[6]. (Table 1)

Table 1: Changing face of India in the millenium

Sl.no	Indicator	2001	2011	2015	2018
1	Population	1.02 bn	1.21 bn	1.31 bn	1.35 bn
2	<18 years population (%)	45.6	38.9		39.7%
3	>60 years population (%)	6.4	8.6	8.9	
4	Males (%)$	52	51.5	51.9	51.4
5	Females (%)$	48	48.5	48.1	48.2
6	Sex ratio (females per 1000 males) $	933	940	935	946
7	Overall literacy (%)**	64.8%	73%	71%	84.11
7.1	• Male literacy (%)**	75.3%	82.4%	83%	88.76
7.2	• Female literacy (%)**	53.7%	65.6%	67%	79.11
8	Urban population (%)*	27.7	31.16	32.8	33.2
9	Per capita income (₹)(INR)@	23095	64316	87748	112764
10	GDP changes (annual growth rate)	4.15****	6.69%****	9.0%***	8.4%***
11	Vehicles ('000's)	54991	141865	210023	230031[6]
12	Road length ('000 km)	3373	4676	5472	5603[6]
13	Mobile phone subscribers (millions)##	6.5	893.8	1001.6	1168.9

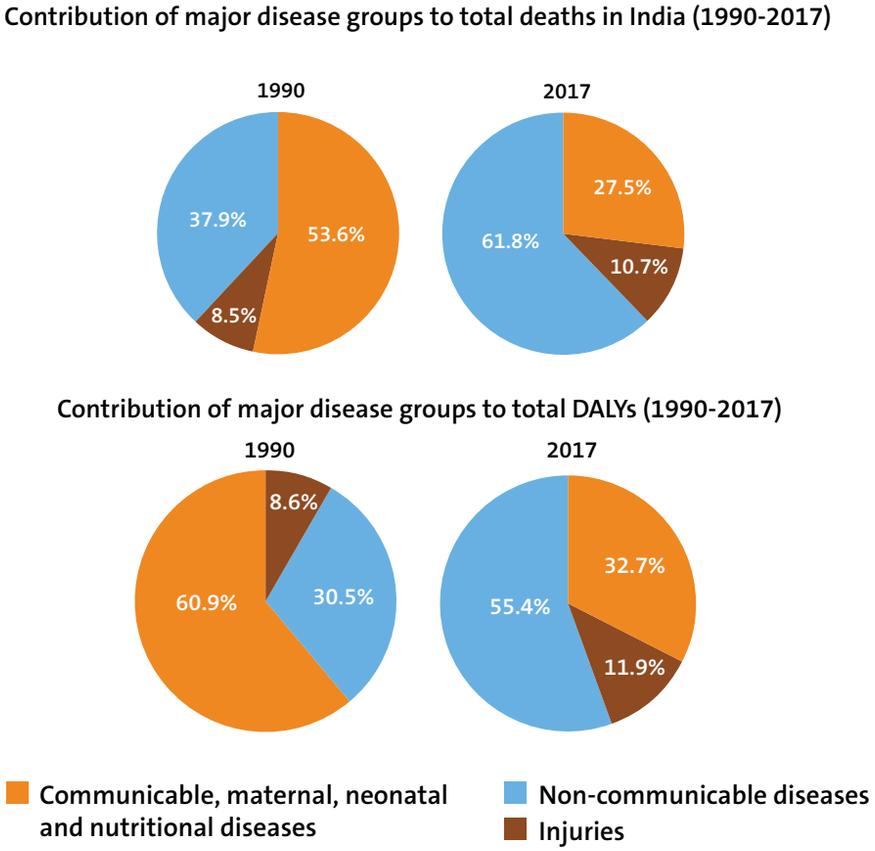
Source
$ - Govt of India - Census, Source: Census of India, 2001 and 2011 (4)
*mhrd.gov.in/sites/upload_files/mhrd/.../PopulationProjection2016%20updated.pdf.(1)
**http://www.mospi.gov.in/sites/default/files/reports_and_publication/statistical_publication/social_statistics/Chapter_3.pdf(9), India in Figures - 2018(8)
**** http://planningcommission.nic.in/data/datatable/data_2312/DatabookDec2014%202.pdf(10)
@ Economic Survey of India(7)
##Mobile subscribers=https://www.statista.com/statistics/498364/number-of-mobile-cellular-subscriptions-in-India/(11)

Progress in recent years have contributed to a decrease in infant mortality, maternal mortality and vaccine-preventable diseases (Table 2 and 3). As per various demographic indicators, crude birth rate per 1,000 persons was 21.4 (2013) and dropped to 20.4 in the year 2016. Similarly, the crude death rate per 1,000 persons reduced from 7.0 to 6.4 between the years 2013 to 2016. The infant mortality rate per 1,000 live births declined from 44 in 2011 to 34 in 2016. Similarly, the mortality rate among kids under the age of five decreased from 49 per 1,000 live births in year 2013 to 39 in 2016[8].

1.2 Changes in mortality, morbidity and disability patterns

The socio-economic growth of the country and health reforms have also contributed towards epidemiological transition, resulting in better control of communicable diseases as well as diseases pertaining to maternal and child health. However, there has been a rise in non-communicable diseases and injuries resulting from modern day lifestyles and habits. The increased exposure to behavioural lifestyle-related risk factors, motorization and travel has resulted in a consequent increase in deaths due to non-communicable diseases (NCDs) (37.9%% to 61.8%) and injuries (8.6 % to 11.9%). Not only has the overall number of deaths increased, the distribution has changed significantly [13]. DALY is a measure of disease burden with factors such as premature mortality and life lived with disability into consideration[14]. One DALY is one year worth of healthy life lost. The higher the DALYs, the more the burden. DALYs due to NCDs and injuries has changed from 14566966 to 10660827 and 14308155 to 7060927 respectively during 1990 to 2017[12].

Figure 1: Contribution of major disease groups to total deaths and DALYs (1990-2017)



In keeping with the rapid changes in the epidemiological profile, there is a pressing need to reorient health care systems, health information systems, infrastructure and manpower. This step is essential not only to minimize communicable diseases and maternal/child health problems, but also to address the current epidemic of NCDs and injuries.

1.3 Children are our greatest resources

According to the United Nations Convention on the Rights of the Child - Article 1, a child is defined as a human being below the age of 18[15]. While other bodies such as UNICEF, WHO and various ministries under the Government of India resort to different definitions, in this report we have considered the aforementioned definition as adopted by the United Nations General Assembly on 20th November, 1989[15].

Nearly 30% of India's population is under the age of 15 and close to 40% is under 18[4]. Four out of ten Indians are under the age of 18[4]. According to 2011 Census report, there were nearly 444 million children in India (233 million males; 211 million females). Profile of the children is presented in Table 2.

Table 2: Profile of children in India (Census 2011)

Sl no.	Indicator	2011 (Census)	%
1	**Number of children (under 18 years)**	**44,41,53,330**	**39%**
	0-4	11,28,06,778	25.4%
	5-9	12,69,28,126	28.6%
	10-14	13,27,09,212	29.9%
	15-17	7,17,09,214	16.1%
2	**Gender ***		
	Boys	23,24,68,505	52.3%
	Girls	21,16,84,825	47.7%
3	**Residence ***		
	Urban	12,00,78,346	27%
	Rural	32,40,74,984	73%
4	**Child labour (in millions)***		
	5-18 years	33	NA
	5-14 years	10.13	NA
5	**Families below poverty line (in millions)****	269.78	NA
6	**Families with access to drinking water*****		
	Basic (at least)	NA	88%
	Limited (more than 30 min)	NA	4%
	Unimproved	NA	7%
	Surface water	NA	1%
7	**School enrollment ratio - Upper Primary (in millions)**	63	-
	School enrollment (Secondary education)[18]	20	

Source: *Census 2011[4]
**India in Figures[8]
***WHO/UNICEF (2017) Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG baseline[17]

1.4 Mortality, morbidity and disability among children in India

Health, education and development of children have improved greatly due to the changes in overall socio-economic and health reforms in India. Between 2001 and 2017, the infant mortality rate reduced from 63 to 32 per 1,000 live births while the mortality rate of kids under five years of age also decreased across various economic groups[19]. The decline in mortality rate was also observed among children between the ages of five and 14. Likewise, a decrease in crude death rate among all age groups decreased from 8.4 to 7 per 1000 persons. This achievement is largely attributed to health reforms leading to better Mother and Child healthcare (MCH), control of communicable, nutritional and vaccine-preventable diseases.

As per the United Nations Inter Agency Group[19] for child mortality estimation, 6.3 million children under the age of 15 died globally (2017), of which 18% were from India. In India, deaths among children (0-14 years) accounted for 11.7% of all medically certified deaths (0-4 years=9.8%, 5-14 years=1.9%; MCCD-2015)[20]. Over the years, the proportion of deaths among children due to all causes has also registered a decline.

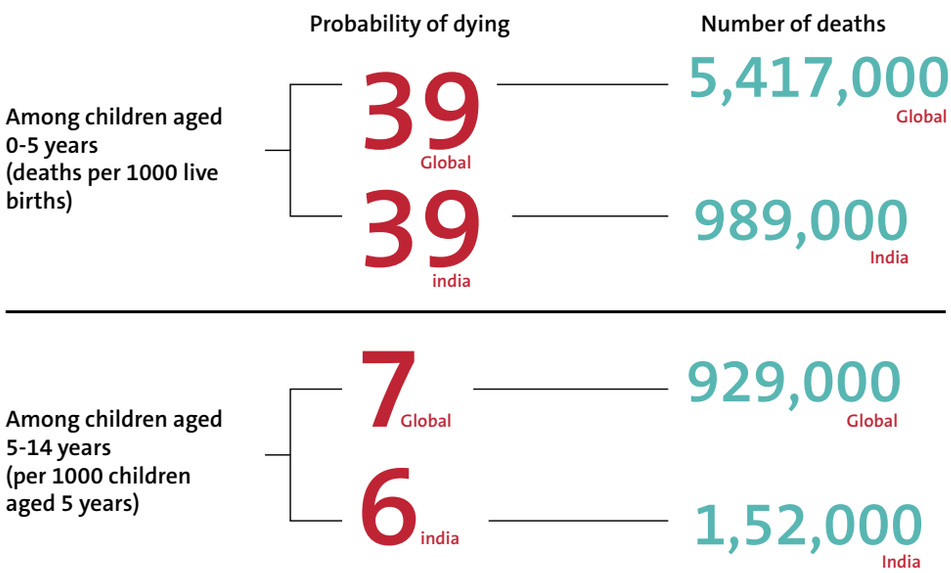
Children today are increasingly influenced by social, cultural and economic influences, thanks to the rapid proliferation of online media. While it has been widely acknowledged that several health problems in adulthood have their roots in childhood, several risk factors like use of tobacco and alcohol, dietary influences, greater use of vehicles and personality changes are now increasingly found in younger age groups. The complex interplay of globalization and lifestyle changes, socioeconomic conditions and greater exposure to unsafe products has led to increased deaths and disabilities due to injuries among children in India. Keeping this scenario in mind, there is a need to understand the current situation of child injuries in India to develop a comprehensive plan to address this problem systematically.

Table 3: Health and social indicators of India (2001-2017)

Sl. no.	Indicator	2001	2011	2015	2016	2017
1	Infant mortality rate (per 1000 live births)*	63	44	37	34	32
2	Under five mortality rate (per 1000 live births)**	301	178	28	41	44
3	Child mortality**	5.9	4.1	2.0	1.7	3.6
4	Deaths in the age group of 5-14 years***	3.4	2.1	1.6	1.6	1.5
5	Fertility rate (total births per woman)**	3.2	2.5	2.3	2.3	NA

Source: *http://niti.gov.in/content/infant-mortality-rate-imr-1000-live-births[19].
**Estimates generated by the UN Inter-agency Group for Child Mortality Estimation (UN IGME) in 2018[19]

Figure 2: Probability of dying and number of deaths (Year 2018) - Global and India

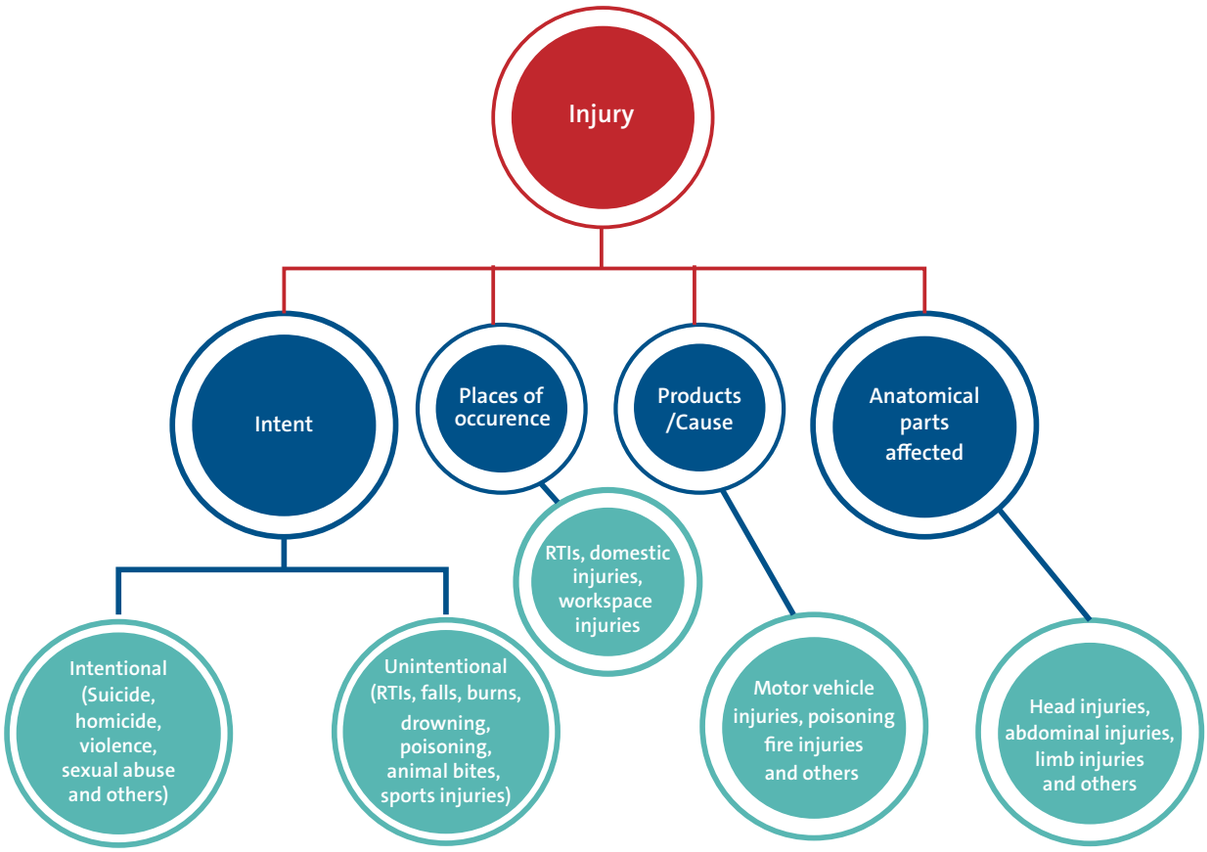


An injury results from a sudden exposure to physical agents such as mechanical energy, heat, electricity, chemicals and ionizing radiation that interacts with the body in amounts, or at rates that exceed the threshold of human tolerance[21]. In some cases (drowning, frostbite), injuries also result from the sudden lack of essential agents such as oxygen or heat[22]. This acute exposure and consequent human-agent-environment interaction results in organ damage when it exceeds the physiological tolerance of the individual.

Typically, injuries are classified based on intent as: unintentional and intentional. Unintentional injuries include road traffic injuries (RTIs), falls, burns, drowning, mechanical injuries, fall of objects and sports injuries among others. Intentional injuries include those caused due to interpersonal conflict, violence (domestic, youth, etc.), suicide, deliberate self harm and child maltreatment among others. (Figure 3)

Injuries are classified as per International Classification of Diseases (ICD) under anatomical and external codes to facilitate comparisons and deeper understanding. Injuries are also classified based on place of occurrence (road, home, or play site injuries) and products causing injuries.

Figure 3: Types of injuries



2. Scope and objectives of the report

The purpose of this report is to present a holistic view of the current scenario with regard to unintentional childhood injuries. It brings together data (published and unpublished) on unintentional childhood injuries in terms of burden, determinants and impact. A focused study was carried out to examine child safety in schools. Existing policies and programs were renewed to identify the scope, ongoing initiatives and existing gaps. The report provides an in-depth view into the child safety scenario in India and offers a framework to strengthen policies and programmes to reduce childhood injuries in the coming years.

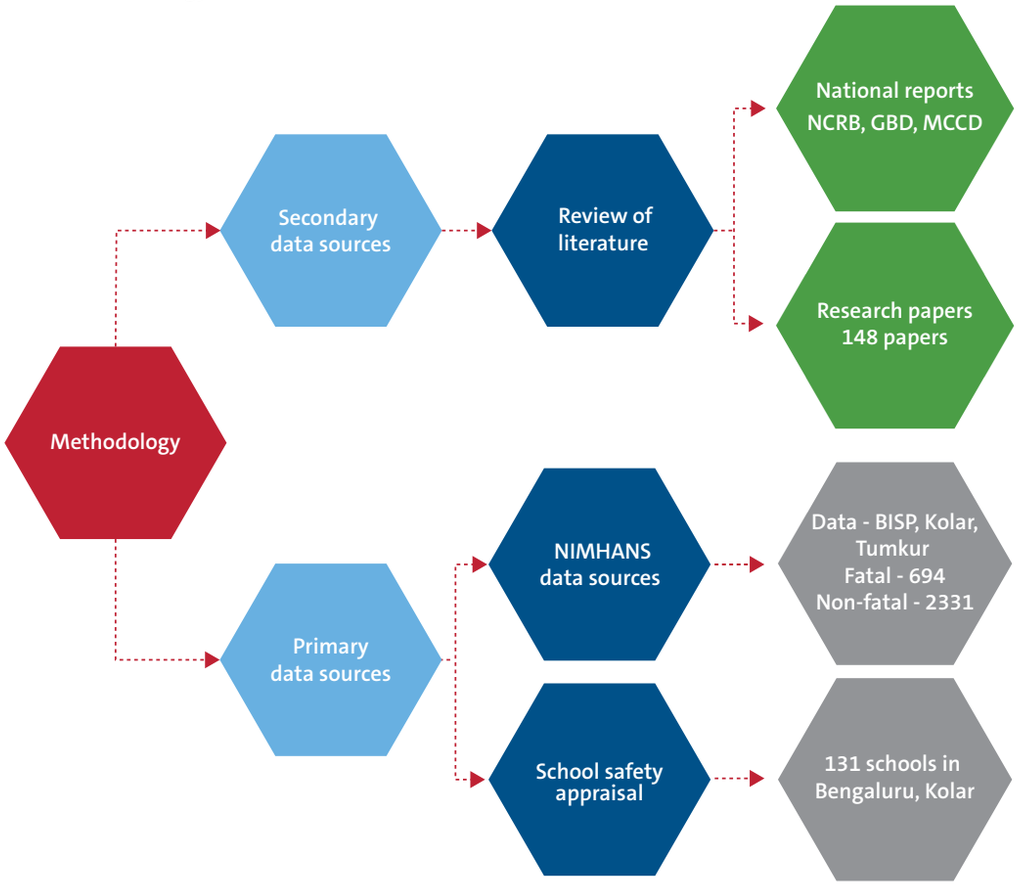
The objectives of this report are to:

- Assess the current burden of unintentional injuries
- Describe distribution of unintentional child injury deaths by age, gender and residence;
- Describe distribution by cause of unintentional childhood injuries;
- Describe risk factors for major causes of unintentional injuries;
- Review intervention strategies and approaches;
- Understand ongoing mechanisms and policies for child injury prevention;
- Chart out an activity roadmap for the consideration of all stakeholders.

3. Methodology

A mixed-methods approach was employed based on a combination of primary and secondary data sources and a brief overview of policies and programmes. Review of data sources included both published and unpublished sources of information on child injury and different types of injuries.

Figure 4: Methodology



3.1 Review of secondary data

A scientific and in-depth understanding of the injury scenario in India is limited due to the lack of good quality data, even though they are a major cause of deaths, hospitalization and disabilities. The data sources for this report include a variety of reports such as Global Burden of Disease Reports, annual reports on road accidents in India by the Ministry of Road Transport and Highways (MoRTH), accidental deaths and suicides in India by NCRB, Medical Certification of Cause of Death (MCCD) and others (Table 4 and Annexures Table 1).

In addition, we reviewed individual national level studies (million death study), projects/reports/programmes (for example, Bengaluru injury surveillance project) and research published by individual researchers.

Table 4: Major data sources for injury information

Report/Study	Source	Strengths	Limitations
Medical Certification of Cause of Death[20]	Office of Registrar General of India	Cumulative data from urban hospitals	Covers only deaths in urban medical institutions and not uniform across the states
Accidental deaths and suicides in India[23]	National Crime Record Bureau (Ministry of Home Affairs)	Comprehensive data of deaths and injuries in India	Coverage, completeness and quality of data not complete
Global burden of disease data estimates[12]	Available from multiple national data sources plus research data sources	Cumulative data of deaths and injuries	Estimates based on available data and based on modelling approaches
Million death study[24]	Nationally representative mortality survey of 1.1 million households	Population-based study using verbal autopsy methods	Reporting of events by people

We undertook an extensive literature search for published research articles using select key search words from different sources like Medline/PubMed, Google Scholar, Safety Lit, Cochrane Library, and Indmed. Only articles and information published after the year 2000 were considered. The research was also kept specific to India and restricted to sources published in the English language. We additionally extracted information from websites of concerned ministries in the Government of India, WHO and UNICEF. While studies specific to children were limited, we extracted information related to children (less than 18 years of age) from statistical tables provided in individual research studies. Injury-related studies restricted to adults were excluded.

- In the course of this research, we reviewed several global reports including World Report on Child Injury Prevention (WHO, UNICEF); Global Status Report on Road Safety, 2015, 2018 (WHO); World Injury Report (WHO) and other national reports (Global Burden of Disease - India Report (2014-2017), NCRB (2005-15), MORTH (2008-17), MCCD (2011-15), Advancing road safety in India (2016) and others.

- In addition to 17 reports evaluated at a national level, we have reviewed and extracted data from research reports like the Bengaluru Road Safety Project and Bengaluru Injury Surveillance Project. After collating about 148 published research articles, a review matrix was developed to collate information from each article. Multiple worksheets were created to contain a review matrix; one matrix for different variables pertaining to injuries. Using information from multiple resources, this report brings together a larger and more comprehensive understanding of the child injury situation in India for the development of policies and programs.

3.2 Primary data sources

NIMHANS data sources:

The Department of Epidemiology at NIMHANS - a WHO Collaborating Center for Injury Prevention and Safety Promotion has undertaken research for several activities over time. As data regarding child injuries is limited, we extracted child-specific data from the projects conducted in Bengaluru, Kolar and Tumkur District. The Bengaluru Injury Surveillance Project (BISP) was a collaborative activity between 25 hospitals, the city police, the city transport department, civic administration and NGOs conducted between 2007-2010. The programme adopted a surveillance approach to gather data between 2009 and 2013[25]. A similar project was undertaken in Tumkur[26]. Analyses of highway crashes from hospitals and police data sources in Kolar was conducted on road traffic injuries[27].

We extracted child-specific data (0-18 years) from the aforementioned databases and analyzed the same. A total of 629 child injury-related fatalities from police records and 19,754 (7020 RTIs) non-fatal injuries from hospital records were analyzed[25-27].

3.3 School safety appraisal survey in Bengaluru and Kolar

Children (5-15 years) spend a significant amount of time of their lives in schools and with increasing school enrolments, safety in schools is a matter of concern. Hence, we conducted a safety appraisal in 131 schools across Bengaluru (urban) and Kolar district (rural). Bengaluru is home to approximately 1.3 million children and 2,125 schools. Kolar has approximately 0.27 million children and 323 schools.

The appraisal was conducted using a safety appraisal tool and data was collected by trained investigators using a mobile application between January-March 2019. [Details in section 2]

3.4 Policy overview

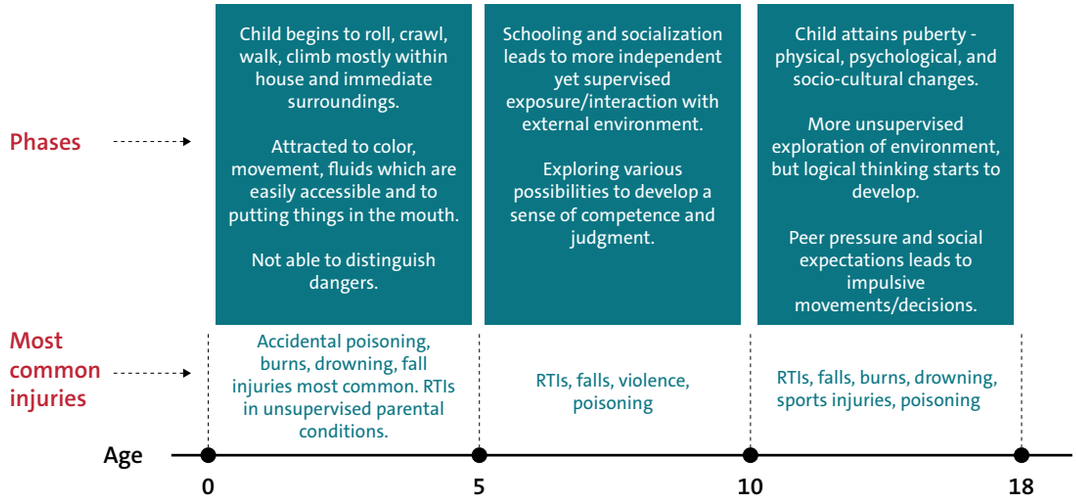
We identified all existing major policies, guidelines and ongoing programmes to address child safety in India. Though not presented in detail, a brief overview of these is included in the report. [Section 3]

4. Injury as a public health problem among children

4.1 Children are vulnerable to injuries

Children live in a world constructed by and for adults. From infancy to adulthood, children undergo developmental changes in physical, cognitive, psychological and social abilities that influence their curiosity, perceptions, risk-taking behavior, judgment and actions/reactions to environmental stimuli, thereby affecting their susceptibility to injuries[28]. Several factors listed below play a complex role in increasing susceptibility and vulnerability of children to injuries (Figure 5).

Figure 5: Injuries commonly expected in different age groups



Developmental and cognitive factors

The cognitive abilities of children are lesser than that of adults as their nervous and motor functions are still developing. Their judgment of danger and risk in their immediate environment (roads, houses, schools) is limited, thereby making them more vulnerable to injuries.

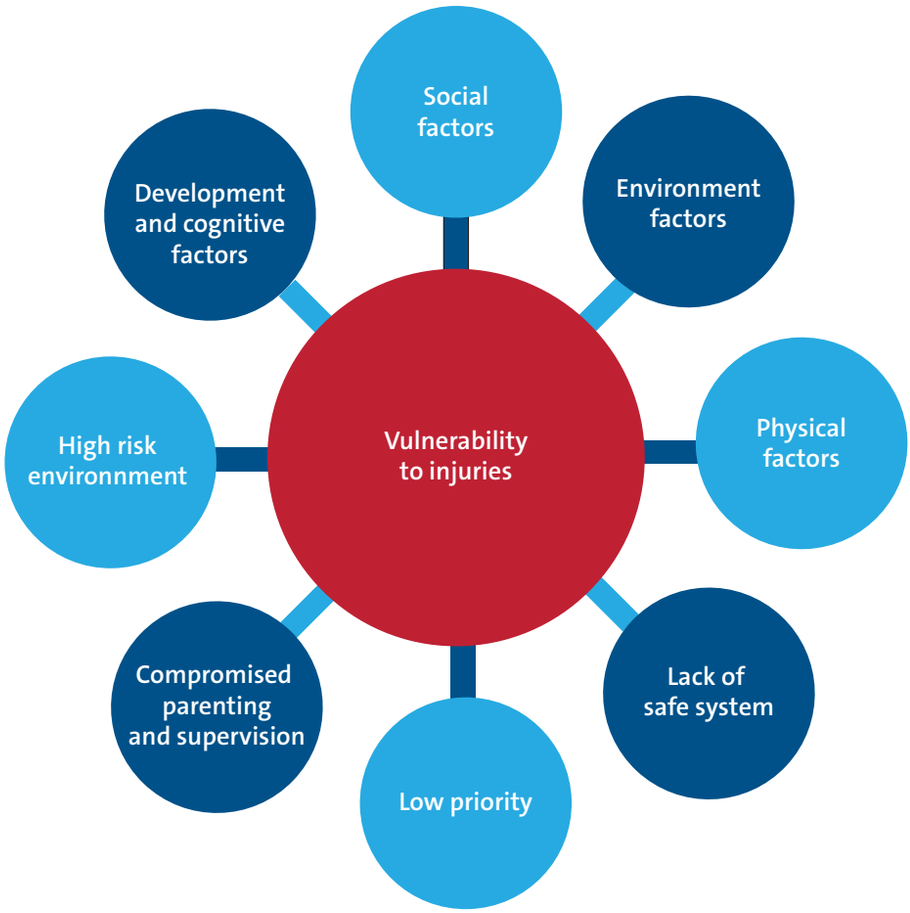
Physical factors

A child's body structure is smaller and softer compared to that of adults. Their smaller size and shape makes them less visible as well. Hence, their energy absorbing capacity is limited, resulting in more body damage by physical forces.

Socio-cultural factors

Children, owing to their age, face immense peer pressure to explore and excel. This results in risk taking and impulsive behavior leading to an increased probability of injury occurrence. Compliance to existing safety rules is also limited amongst children. In addition, culturally in agrarian economies and LMICs, male children take up professional occupations at an early age, thereby increasing chances of work-related injuries.

Figure 6: Factors increasing vulnerability to injuries in children



Evolving parenting and family dynamics
The rise of nuclear families (with working parents) and the gradual decline of joint family systems have resulted in less supervision of children. Parents also have limited priority/perception of the importance of prevention of injuries in a domestic environment.

Environmental factors
The environment in which a child lives and grows is largely designed for adults. Design of buildings, roads, parks, houses, furniture, etc. are seldom designed keeping child safety in mind. Children living near high-risk environments like water bodies, slums, railway lines, etc. are more prone to injuries.

System-related factors Systems for injury prevention in terms of policies, programmes, guidelines, safety equipment(s), safety processes and transportation vehicles are typically not customized for children. Many countries still do not have appropriate child protection laws or enforcement mechanisms for child protection and have limited institutional mechanisms and infrastructure affecting their safety [21].

4.2 Understanding child injuries

Data sources are vital to understanding the burden, nature, determinants and characteristics. The true burden and estimates of burden, mortality, morbidity, disability and impact are dependent on the quality and coverage of available data sources.

Data sources for child injuries
In an ideal situation, one would expect regular and quality data regarding determinants, injuries, deaths, treatment outcomes, trauma care systems, cost of injuries and safety performance, to be readily available in order to drive child injury policies and programs. It is imperative to have quality, timely, reliable and comprehensive data systems in order to organize and implement child injury prevention programmes.

In an era of evidence-based public health, information regarding child injury burden, types, distribution, trends, risk factors, treatment, outcomes and disabilities is essential in order to plan and implement injury prevention programmes. Due to the correlation between injuries and socio-cultural environmental changes, quality data is useful to understand associations between these determinants. This data also helps identify the contribution of injuries to overall causes of deaths and disabilities among children. This information is vital for optimizing and allocating resources in an equitable manner to ensure that childhood injuries, deaths and disabilities are prevented in the most cost-effective manner.

However, a valid and reliable data source for childhood injuries or injury surveillance systems, either at a state or national level, does not exist in India. This is characteristic of several low and middle-income countries around the world.

Current data sources
At the national level, limited information on child injury deaths are available from different sources like the Registrar General of India (Medical Certification of Cause of Death (MCCD), the National Crime Report Bureau (NCRB), Million Death Study, World Health Organization (WHO) estimates, the Global Burden of Disease (GBD) study and from few other independent studies. However, these secondary sources are not specific to children alone and child-specific information within these sources is limited (Annexure Table 1).

Currently, police records serve as a major data source for child injury information in India. Information compiled by the various State Crime Records Bureau is collated at a national level and reported by the National Crime Records Bureau[23]. In addition, the Ministry of Road Transport and Highways provides information regarding Road Traffic Injuries. As injuries are medico-legal in nature, police records continue to be the main source of injury-related information in India. However, factors such as under-reporting, the lack of a robust system for data collection, and frequent changes in the documentation process make it difficult to extract accurate and adequate information from these reports.

Data from hospitals (hospital-based-injury surveillance) on the various kinds of injuries is not available, nor standardized across the country. A systematic notification system of the number of

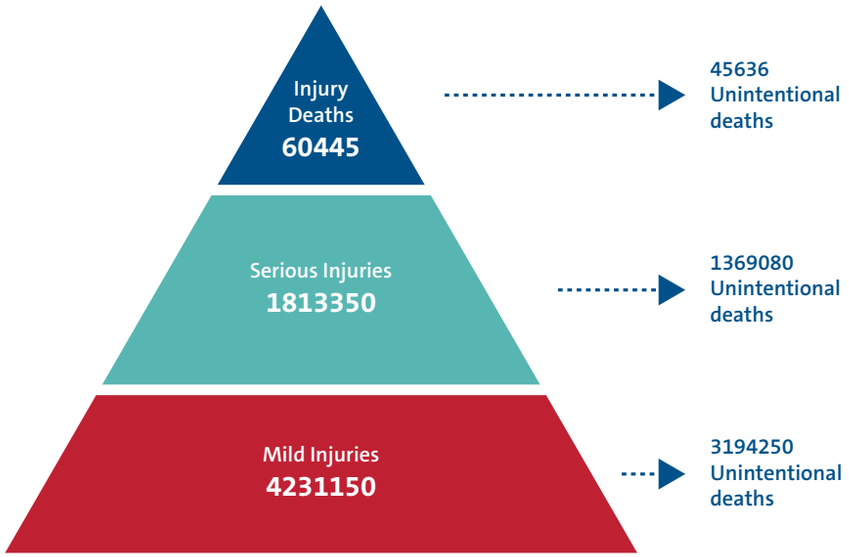
accidents, injuries and fatalities from different healthcare facilities to a higher authority is also absent. Injury surveillance and trauma registries have been attempted in select centers by individual researchers but a concerted national effort is lacking[25].

Studies such as the Global Burden of Disease reports by the IHME - USA, reports by the WHO and India-specific studies provide an estimate of child injury deaths and DALYs, causes and risks from data sources available to them. These estimates are based on statistical modeling methods. Independent research studies are few in number and have limitations in terms of sample size, case definitions, durations covered, assessment procedures, outcome measurements and interpretations and are thus, not comparable. Research evidence is sporadic and limited to parts of the country where few professionals are actively involved in child injuries. Evidence obtained from published research, though helpful for a broader understanding, cannot be used to draw finite conclusions or make extrapolations for the country. Nevertheless, they are useful sources of information in order to understand risk factors, issues of under-reporting and outcomes.

Challenges in available data

Apart from the availability of data regarding child injuries, challenges exist in available data which limits our understanding on injuries in general and childhood injuries in particular to a greater extent. These include different definitions of children based on age groups, non-uniformity in comparisons, underreporting of injury data, variations in data collection procedures, inclusion or exclusion of specific injuries, study designs, statistical interpretations and others. These factors contribute to variations and non-uniformity of data and extrapolations based on data need to be interpreted with caution.

Figure 7: Deaths due to injuries in India (<18 years)



4.3 Burden of childhood injuries in India

Global scenario

Globally, the epidemiological patterns of child deaths have shown a considerable shift from communicable to non-communicable diseases and injuries. Despite large scale medical and public health interventions at national and local levels, the risk of injuries among children, especially in low and middle income countries (LMICs), continues to be on the rise.

Nearly 950,000 children died of injuries in the year 2004 globally, of which 60% were due to unintentional injuries[21] in the age group of 0-18 years. Unintentional injuries in the age group of 0-14 accounted for 652,664 deaths globally in the year 2017, accounting for nearly 10.6% of all deaths in that age group[12]. In addition to the deaths, tens of millions of children require hospital care for non-fatal injuries. Injury leaves many children with some form of disability; for some it has lifelong consequences. Nearly 36,239,865 (36.23 million) DALYs were lost worldwide due to injuries among children in the age group of 0-14 of which 17.6% were accounted by India alone[12].

Indian scenario

India accounted for 11.1% of all unintentional injury deaths globally[12]. Nearly 7% of all deaths in India considering all age groups are accounted by injuries (7,23,178 deaths due to unintentional injuries in all ages) and nearly 10% of these deaths (1 out of 10 deaths) occur among children aged 0-14 years[12].

Unintentional injury mortality in children

It is estimated that 50,371 children aged 0-18 years died in India due to injury causes (natural + unintentional + intentional) in 2015 (NCRB). After adjusting for under-reporting (based on Indian observations), the number of deaths for the year 2015 is estimated to be around 60,445.

Table 5: Mortality due to unintentional injuries in India, as per available reports

Agency	Year	Age group	Deaths	% of Deaths
NCRB	2015	0-14	15096	-
GBD	2017	0-14	72268	6.6%
MCCD	2015	0-14	-	5.1%

Source:
*GBD-2017: Deaths due to unintentional injuries (all ages)= 723178 (children 0-14 years=72268)[12]
MCCD - 2015: Deaths due to injuries (all ages)=73828 (children 0-14 years=3721 [20]
**Nation within nations report, India[13]

Nearly 45,636 deaths were due to unintentional injury deaths arising from causes like RTIs, burns, poisoning, drowning, etc. As per India GBD report of year 2017, 72,268 deaths occurred in the year 2016 due to unintentional injuries[12] while the national NCRB reports (year 2015) indicate that 18,115 (including 20% under-reporting) children aged 0-14 years, died due to unintentional injuries, indicating a four-fold under-reporting in national statistics[23]. As per the injury pyramid (30 serious injuries and 70 mild injuries for every death), it is estimated that nearly 1.81 million children suffered serious injuries and 4.23 million children suffered from mild injuries in the year 2015. (Figure 7).

The NCRB data from 2005-15 indicates that the number of child injury deaths in India witnessed a gradual increase between 2005 and 2013[23]. However, the following year (2014) saw a decline in these numbers. This decline is primarily attributed to the change in classification of unintentional injuries. Sudden death and other miscellaneous categories were clubbed as a separate group for all age brackets, thereby, decreasing the number of unintentional injuries.

In Karnataka, nearly 2,045 children (0-14 years) died due to unintentional injuries in 2017, accounting for 11.89% of all deaths.

Proportion of deaths due to injuries

GBD reports indicate that child injury deaths (0-14 years) accounted for 6.6% of total deaths[12], while MCCD reports indicate the same to be 2.7% of all causes of deaths in the same age group[20].
For every 100 children (0-14 years) deaths every year, 5-7 deaths are due to unintentional injuries.

Data from studies conducted by NIMHANS, based on police records (data in Bengaluru[25], Kolar[27] and Tumkur[26]), revealed that child injury deaths (under 18 years) constituted nearly 7.86% of all injury deaths[25-27].

Unintentional injury mortality rate

A large sample-population-based study[24] reported an injury mortality rate of three per 1,000 live births among children aged 0-4 years and 27 per 1,000 children among those aged 5-14 years[24]. The study also reported that for every million children aged 0-14 years, 382 died due to unintentional injuries in the year 2017. These numbers and rates of unintentional injury deaths, are only expected to increase due to an increase in macro-level determinants such as motorization, industrialization, urbanization and globalization. With children accounting for 39% of the population, the expected socio-economic impact of injuries in the future years is estimated to be significant.

Children hospitalized for unintentional injuries

The word 'hospitalization' is qualified as a supervised professional environment for the treatment of moderate to severe injuries. Data on hospitalization is limited due to absence of hospital-based surveillance systems. Hence, it is difficult to estimate the number of injury-related hospitalizations among children. However, estimates based on NCRB data indicate that nearly 1,81,000 children (0-14 years) suffered from serious injuries and needed hospital care[23]. An earlier review, estimated that nearly two million children in India are hospitalized every year due to unintentional injuries[28, 31]. It is therefore imperative to build data systems in hospitals in order to collate information on hospitalization due to injuries[31]. Doing so will not only help plan healthcare systems better, but also help estimate the burden on the caregiver and the socio-economic cost of care for children in India.

Disability and impact

Injuries can endanger child safety in society[31]. Any form of injury/disability can lead to significant physiological, psychological, social, environmental and financial burden, thereby affecting the day-to-day routine of children as well as their families.

The extent and impact of disability is directly dependant on the age of the child and the severity of the injury. For instance, a burn injury can result in disfigurement and/or a major handicap, while a fall could result in the child being in a permanent vegetative state. A brain injury can result in severe cognitive impairments while injury to the eyes can lead to permanent loss of vision, as observed in case of injuries caused by fireworks.

Injuries resulted in the loss of 6,354,369 DALYs (6.35 million DALYs) and 72,268 deaths among children aged 0-14 in the year 2017 in India[12]. Nearly 11% of DALYs lost among children (0-14 years) in India was due to injuries[12]. In Karnataka, 19% of DALYs among children (0-14 years) were due to unintentional injuries[30].

In a large scale population-based study of TBIs in Bengaluru, it was observed that nearly 15% of injured children had varying levels of disability at 24 months post discharge[32]. Studies including all age groups indicate that 15% of all disabilities are caused due to injuries[32]. However, data on disabilities due to childhood injuries is limited. Similarly, other studies have reported that 19-72% of TBI victims experience disability[33].

Table 6: Outcome of Traumatic Brain Injury victims (all age groups):

Author	Place	Size	Outcome			Data sources
			Good recovery	Disability	Death	
Agarwal D. et al* (2016)[34]	New Delhi	2,068	45%	19%	22%	Neurosurgery dept. based retrospective data of head injury cases admitted at level 1 trauma care unit
Shekhar C. et al (2015)[35]	New Delhi	796	80%	-	20%	Neurosurgery dept. based retrospective data and follow up of head injury cases
Yattoo G.H. et al (2008)[36]	Kashmir	547	93.6%	-	6.4%	Emergency dept. based prospective study of head injury cases between 1996-2003
Gururaj G. et al (2005)[28]	Bengaluru	4,731	28.7%	62.1%	5.5%	Neurotrauma centre ER dept. based prospective data of all admitted head injury cases
Agarwal A. et al (2012)[34]	Maharashtra (Rural)	1,926	66.5%	33.5%	6.4%	Neurosurgery unit based retrospective study of admitted head injury cases 2007-2009
Deb Nath H. et al (2011)[37]	New Delhi	70	10%	76%	14%	Neurosurgery dept. based retrospective data at JPNATC 2008-2009

*14% in vegetative state

'Psychological impact' refers to the psychological and social impact of an injury on a child. It also takes into consideration factors such as caregiver burden and the overall effect of the outcomes of the injury on the family. Stress, post-traumatic stress disorder and cognitive deficiencies are recognized outcomes of an injury. It revolves around disability which leads to a handicap in the larger environment where the child resides.

'Economic impact' refers to the direct and indirect cost of care for injuries. It is estimated to cost approximately 5% of the GDP (3% due to RTIs)[28, 38, 39]. However, data specific to children is limited.
Cost of care assessment studies amongst individuals of all ages reveal the following:

- Studies in Bengaluru revealed that on an average the families spent Rs 2,601 (minimum to maximum Rs 100-Rs 18,650) per injury[40]. Surveillance project in Bengaluru indicated that poor and non-poor spent an average of 18,000 and 27,000 rupees on medical cost for every injury-related hospitalization. Additional cost of vehicle and property damage was 10,000 to 25,000 rupees[28].

- Cost of care assessment among 95 RTI victims in an urban hospital setting in India (year 2009) indicated medical costs accounted for 43% of costs. Average cost per person was; Surgery (Rs. 4,500), Prosthesis (Rs. 2,450), Laboratory charges (Rs. 1,600), Medicines (Rs. 1,000)[41].

- An assessment of out-of-pocket (OOP) expenditure for medical care for injuries for patients admitted for at least one night in a tertiary care hospital in Chandigarh indicated that the average OOP expenditure per hospitalization and for 12 months post discharge was USD 388 (95% CI: 332-441) and USD 1,046 (95% CI: 871-1,221) respectively. The mean OOP expenditure for RTI and non-RTI cases during hospitalization was USD 400 (95% CI: 344–456) and USD 369 (95% CI: 313–425) respectively[39].

4.4 Age really matters

Distribution of child injury deaths by age

Globally, the number of unintentional injury deaths are higher among children <five years of age (379,138) than among children aged between five and 14 (273,526). Deaths due to unintentional injuries accounted for 37.3% of all deaths in the age group of 5-14 as against 7% in the age group of 0-4 year old children. **Injury death rate** was higher in the age group of 0-4 (28.01 per 100,000 children) than in the age group of 5-14 (8.71 per 100,000 children)[12].

In India, injury death rates are higher among younger age groups, the number of deaths are higher among children above five years of age. Injuries accounted for nearly 3.8% to 20.1% of deaths in the age groups of 0-4 and 5-14 years of age respectively, an estimate reflecting the global pattern. The injury death rate is estimated to be higher in the age group of 0-4 (29.47 per 100,000 children) as against in the age group of 5-14 (8.73 per 1,00,000 children)[12, 30].

Table 7: Burden of unintentional injuries among children (<5 and 5-14 years)[12]

	Global		India		Karnataka	
	<5 years	5-14 years	<5 years	5-14 years	<5 years	5-14 years
Total DALYs	21,084,713	15,155,160	3,568,441	2,785,928	1,04,710	92,747
Percentage of DALYs	5.2%	11.8%	3.65%	9.4%	3.75%	15.5%
Total deaths	3,79,138	2,73,526	40,752	31,516	1,137	908
Percentage of all deaths (95% UI)	7.0%	37.3%	3.93%	20.1%	3.53%	8.36%
Note: Unintentional injuries include (Unintentional + RTI injuries)						

The NCRB report (2015) indicates that children under the age of 18 accounted for 45,636 injury-related deaths while children between the ages of 15 and 18 accounted for 27381 (61%) injury-related deaths [23]. The Medical Certification of Causes of Death Survey indicates that nearly 2.9% of all deaths were due to injuries in the age group of 5-14 years of age[20]. The Million Death Study[24] estimated that injury-related deaths accounted for nearly 19% of all deaths in the age group of 0-14.

Evidence clearly indicates that among children aged between 0-14, 14-19% of all deaths are due to unintentional injuries. This figure stands at 2-3.8% for children aged between 0-4. The age distribution, as observed from various studies, indicate that injury-related deaths are higher among children above the age of five, as compared to children under the age of five. The number of injury-related deaths reaches a peak among children above the age of 10, indicating a strong correlation with increased mobility, exposure to environment, travel, recreation and schooling.

An analysis of the age distribution of 629 unintentional injury-related deaths by NIMHANS revealed that 16% of children were under the age of five, 24% in the age group of 10-14 and 42% in the age group of 15-18. The distribution by single age group showed that the maximum number of deaths were in the age group of 14-17[25].

Apart from deaths, the percentage of DALYs lost due to injuries was nearly twice as much in the age group of 5-14 (7.8%) as compared to DALYs lost among children under the age of five (3.4%). In Karnataka, the percentage DALYs lost due to injuries (15.9%) was higher in the age group of 5-14, almost four times higher than the DALYs lost due to injuries among children under the age of five (3.75%). Data for 19,574 non-fatal injuries across 25 hospitals in Bengaluru revealed that 51% of all non-fatal injuries occurred among children above the age of 14 years[25].

4.5 Male children are affected more

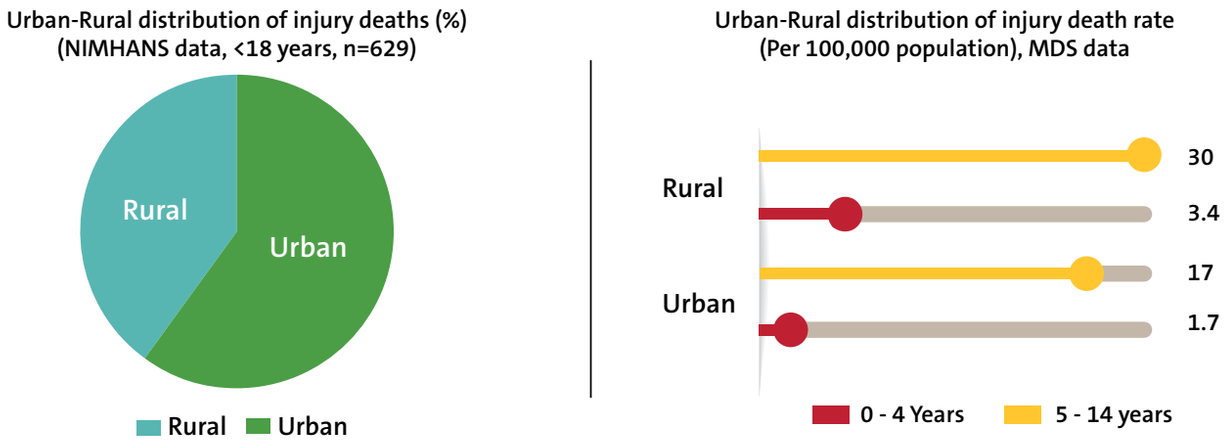
Multiple data sources/reports indicate that unintentional injury deaths are higher among males (48-76%) as against females (23-51%). NCRB and MDS reports suggest that nearly 62-69% injury-related deaths in the age group of 0-14 years occurred among males. Data from GBD, MCCD and NIMHANS varied between 40-53% for male distribution of injury deaths. Injury death rate per 100,000 lakh people is nearly three times higher in males (26 per 100,000 people) as against females (9 per 100,000 people).

4.6 Urban-rural distribution

The urban-rural differential indicates inequalities in risk factors, greater role of injury causation factors as well as access to quality and timely trauma care. While it is assumed that injuries would be higher among children in urban areas as against among children in rural areas, data with regard to urban-rural distribution is limited. Available research indicates that the child injury mortality rate per 100,000 children is higher in rural areas, with 3.4 deaths per 100,000 in the age group of 0-4 and 27.32 deaths per 100,000 in the age group of 5-14 years, as against the death rates in urban areas - 1.7 per 100,000 [age group: 0-4 years] and 17 per 100,000 [age group: 5-14 years][24] [Figure 8]. The higher mortality in rural areas indicates limited access to quality pre-hospital and hospital level trauma care systems as well. Moreover, more severe cases are referred to urban areas.

Apart from injury mortality rate, distribution of deaths by place of residence revealed that 40.3% of injury-related deaths occurred in rural areas as against 59.7% in urban areas[25-27]. This is largely due to better documentation of severe cases in urban areas as against documentation in rural areas.

Figure 8: Urban-Rural distribution of injuries in children

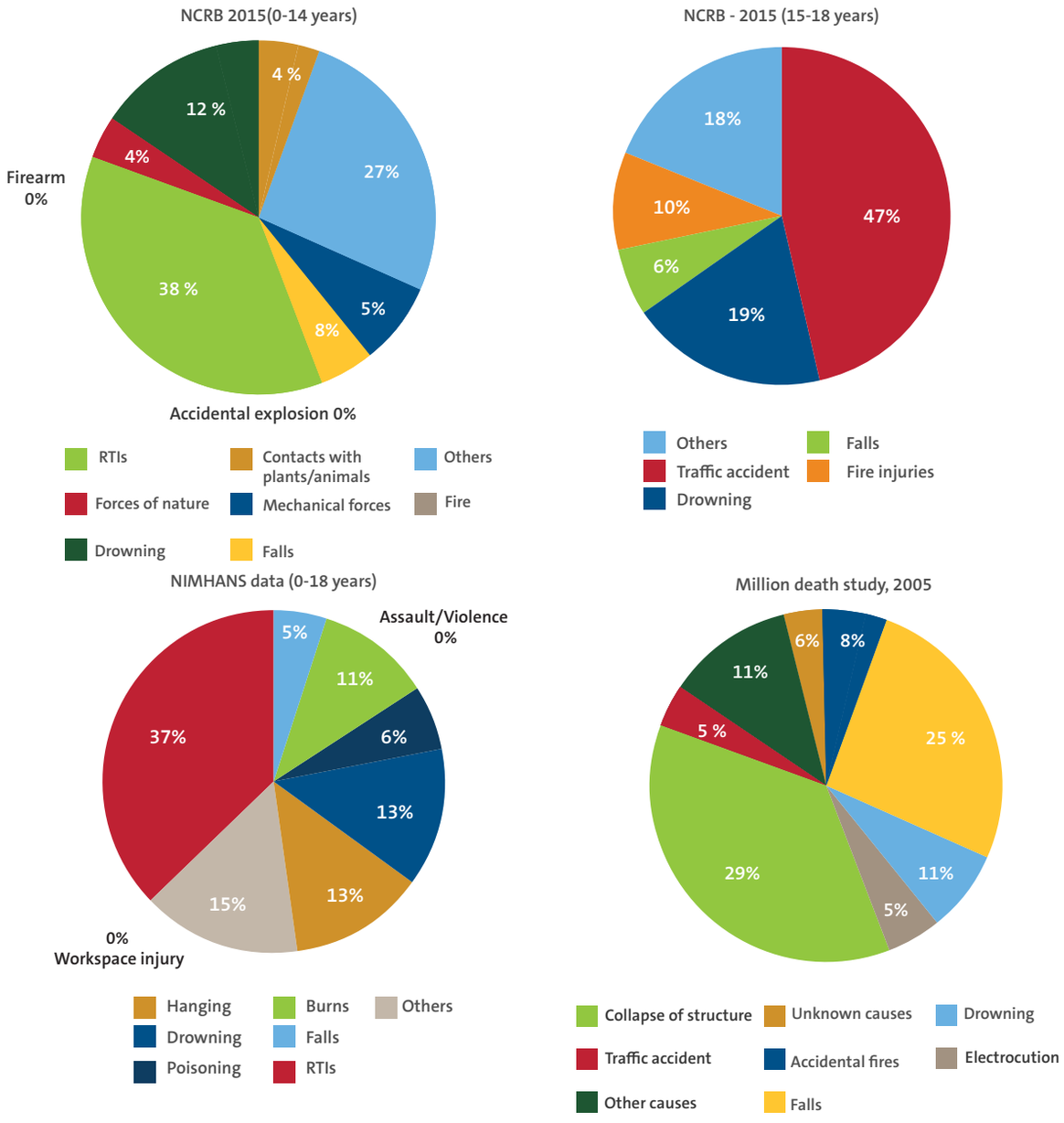


4.7 Causes of unintentional injuries

Understanding the major causes for unintentional injury deaths is vital to plan measures for prevention and control. It is important to note that this distribution and proportion is influenced by age and place of residence among other factors. **RTIs, drowning, falls and burns were reported to be the leading causes of child injury deaths globally, accounting for nearly 83% of all child deaths[12, 21, 29].** As per the GBD report, drowning was the leading cause for child injury deaths worldwide, followed by RTIs and falls. India accounted for 30% of all worldwide fall-related deaths among children and 22% of all burns-related deaths. These numbers contributed to significant loss of DALYs as well[21].

Police data sources (NCRB-2015) reveal that traffic accidents (47%), drowning (19%), falls (6%) and burns (10%) are the leading causes for unintentional injury deaths among children in the age group of 0-18 years in India (Figure 9)[23]. A study of the gender-specific distribution revealed that the proportion of burn injuries (15%) and falls (10%) was higher among females. Every fifth child injury death in the age group of 0-18 in India is due to a traffic accident - a leading cause of child injury deaths in India[21, 23].

Figure 9: Causes of injury-related deaths by different age groups



Traffic accidents were the leading cause of deaths in 2005, accounting for 36% of all deaths. This number rose to 37% in 2010 and to 38% in 2015. Similarly, the proportion of deaths caused by drowning increased from 20.9% in 2005 to 27.6% in 2015. The proportion of deaths caused by falls nearly doubled between 2005 (4.6%) and 2015 (8.5%). The change in parameters for classification led to major variations in the numbers through the following years. Traffic accidents were reported to be the leading cause of unintentional injury deaths (62.1%-63.9%) among children aged 15 to 18 years, followed by drowning (15.4%-17.7%). Instances of falls were found to reduce considerably among children above the age of five years[23].

Evidence from population data, primarily MDS, revealed that RTIs constituted to 29% of injury deaths followed by falls (25%) and drowning (11%)[42] (Figure 9). MDS study reported that the proportion of falls-related deaths (25%) is three times more than figures (8%) reported by NCRB.

Similar observation was recorded by independent research from five population-based studies[34,40,43–45] which indicated that falls accounted for 35-66% of all injury deaths, much higher than those reported in NCRB. (Annexure Table 2). Burns accounted for 6-13% of all injury deaths in children[28,34,40,43,44,46–49].

Data from NIMHANS reiterated that transport-related injuries (especially RTIs), drowning, falls and fire-related injuries are the leading causes of death, accounting for 68-79% of all injury-related deaths among children (based on multiple sources). The BISP report (2014) revealed that 37% of causes of unintentional injury deaths were due to RTIs, followed by drowning (13%) and burns (11%). Poisoning accounted for 6% of all injuries.
The causes of death also differed by urban-rural distribution. In rural areas, drowning and poisoning were the more common causes for injuries among children as against urban areas (Figure 10 and 10.1)[25, 28].

Figure 10: Distribution of non-fatal injuries among children <18 years

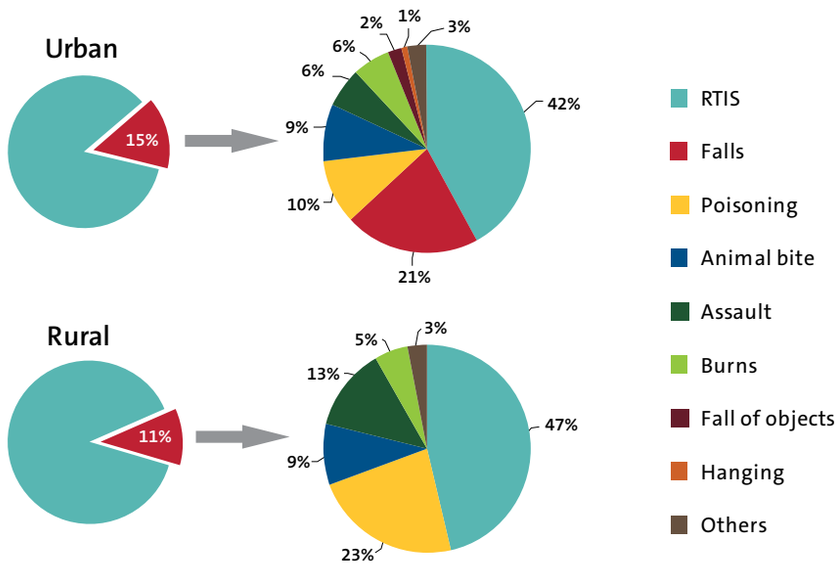
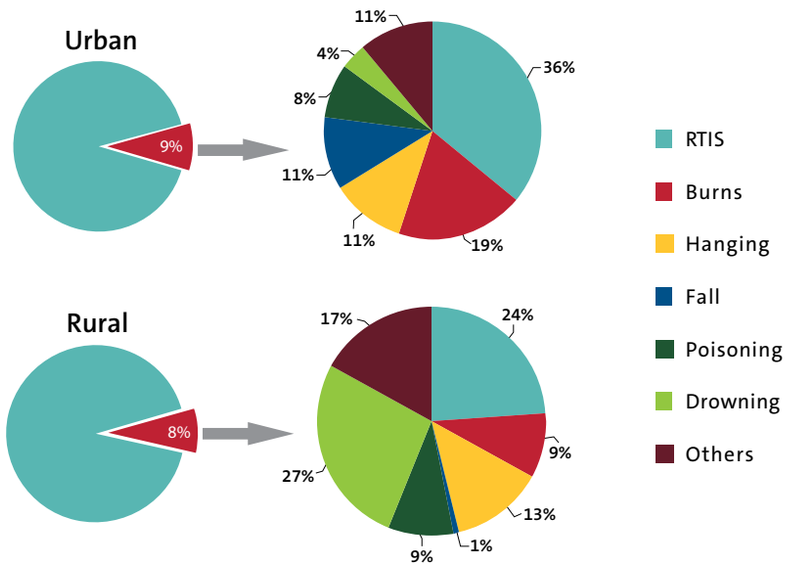


Figure 10.1: Distribution of fatal injuries among children <18 years



By taking multiple data sources into consideration, it is evident that RTIs, drowning, falls, burns and poisoning account for nearly 85% of all child injury deaths. Among younger age groups, falls, drowning, poisoning and burns are more common and as the child grows older, falls and RTIs become more frequent.

Table 8: Causes of unintentional injury-related deaths among children (0-14 years) in India (2005-2015) - NCRB India

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Traffic accidents*	6724	7646	7771	8492	8001	7777	8340	7758	7779	5862	5416
Falls	869	919	892	913	969	918	964	981	1004	1170	1211
Drowning	3934	4555	4335	4247	4193	4529	4794	3926	4808	4054	3921
Burns	2094	1987	1977	2017	2036	2035	2163	1969	2205	1477	1345
Poisoning and animal bites	1796	2058	2119	1986	2113	2143	2264	2660	2516	0	0
Workplace**	31	52	43	41	71	35	72	62	42	28	16
Miscellanous	3683	3800	3968	3836	4210	3847	4061	4019	4704	2711	2469
Total	19131	21017	21105	21532	21593	21284	22658	21375	23058	15005	15096

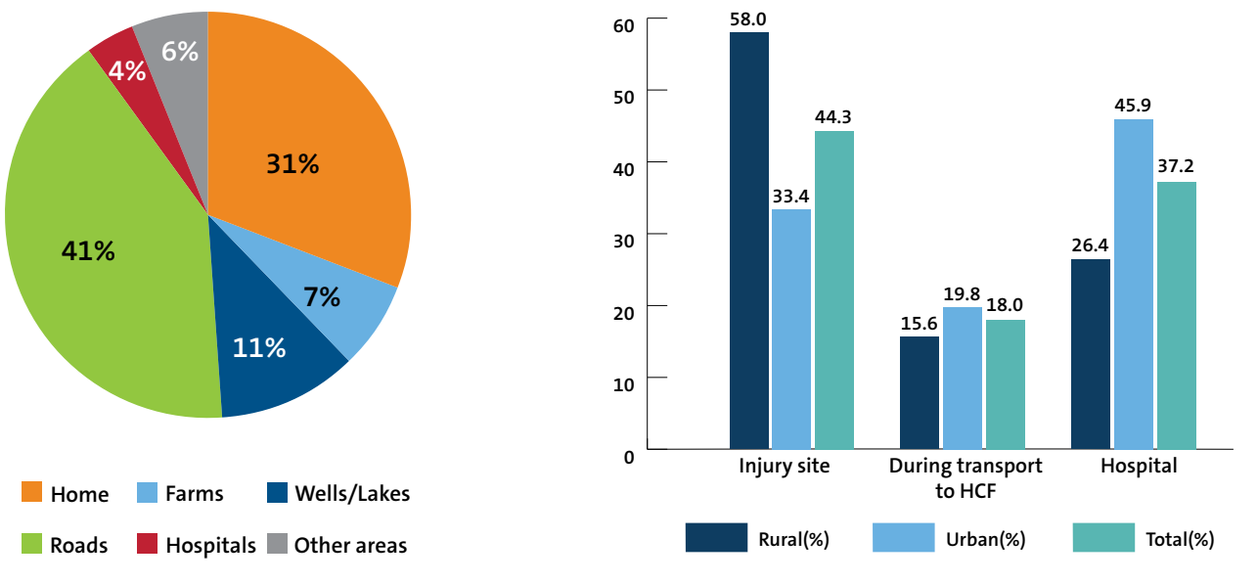
*Traffic accidents includes RTIs and other vehicular accidents

**Workplace includes factory/mine/quarry

4.8 Most deaths happen on roads

Data regarding places of occurrence of injuries is very limited. Data from NIMHANS suggests that roads continue to be the place where most children under the age of 18 were injured. Nearly 41% of all fatal injuries among children were reported to have occurred on roads, followed by 31% at home. Around 11% of fatal injuries occurred in water-related areas such as wells and lakes.

Figure 11: Place of fatal injury among children, 0-18 years (NIMHANS data) (n=621)



A breakdown of place of injuries by rural-urban distribution revealed that RTIs were an urban phenomenon as far as fatal injuries are concerned. Fatal injuries due to accidents in farms and drowning were more in rural areas. Nearly 34% and 25% of fatal injuries in rural areas occurred in homes and near water bodies. In total, 59% of all fatal injuries happened either at home or near a water source in rural areas[25-27].

4.9 Majority of children die at the injury site in rural areas

Data indicates that nearly 44% of all child injury deaths occurred at a site of injury, followed by 37% in hospital and 18% during transit to the hospital[25-27], indicating that more than half of the deaths can be prevented with efficient trauma care systems. Proportion of child injury deaths at the site injury in rural areas (58%) was higher than in urban areas (33%), indicating more severe forms of injuries among children in rural areas. The increased death toll in hospitals are largely attributed to deficient trauma care and increased referrals to urban hospitals. Nearly 45% of all fatal injuries in urban areas took place in the hospital as against 26% in rural areas.

5. Road traffic injuries

Children use roads for various modes of transport and purposes based on availability, accessibility and affordability. With increased motorization and road network development, the exposure of children to traffic environments has increased manifold. Children use roads as pedestrians, cyclists, pillion riders and as passengers in different vehicles such as buses, trucks, mid-sized vehicles and others. It has been acknowledged time and again that roads and vehicles are designed for adults and do not factor in characteristics or behavior of children. In recent years, with the increase in the number of vehicles, improvements in road length and infrastructure and the need to travel more (among children), RTIs have increased significantly and have become a major public health concern.

Global

Globally, estimates indicate that nearly 1,20,000 children lost their lives in road crashes accounting for 1.8% of all deaths among children under the age of 14[12, 29]. RTIs are the 10th leading cause of death among children under five years globally and 3rd leading cause of death among children aged between 5 - 14 years. Nearly 4 out of 5 RTI-related deaths among children occurred in LMICs. In addition, RTIs also resulted in a loss of 9.3 million DALYs worldwide in the year 2016[29].

India

Nearly 17,192 children aged 0-18 years (20,630 children when adjusted for under-reporting of 20%) died due to transport-related injuries in India in the year 2015, of which 15,633 (18,759 adjusted for under-reporting) died specifically due to fatal road crashes[23].

India accounted for 9.8% of RTI-related deaths globally among children in the age group of 0-14 [12]. GBD India report indicates that RTIs resulted in 10,953

Table 9: Deaths due to RTIs - GBD, 2017

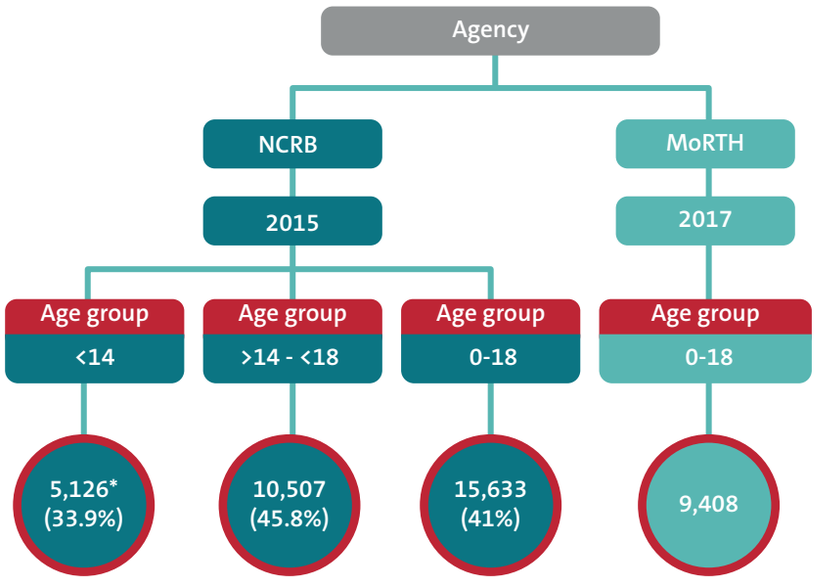
Age	Male	% of all cause deaths	Female	% of all cause deaths	Total deaths	% of all cause deaths
GLOBAL						
Infant*	6,203	0.3	5,454	0.3	11,657	0.2
1-4	21,377	2.9	16,032	2.4	37,410	2.7
5-9	20,227	9.2	13,353	6.9	33,581	8.2
10-14	19,395	10.7	9,435	6.9	28,830	9.0
Total	**67,205**	**2.0**	**44,276**	**1.5**	**11,1481**	**1.8**
INDIA						
Infant*	629	0.1	920	0.2	1,549	0.2
1-4	1,389	1.9	1,229	1.4	2,619	1.6
5-9	1814	4.5	1726	3.5	354	3.9
10-14	2,246	6.5	996	3.1	3,242	4.8
Total	**6,081**	**1.2**	**4,72**	**0.5**	**1,0953**	**1.1**

***Infant - early neonatal, late neonatal and post neonatal**

deaths among children aged between 0-14, accounting for 1.1% of all deaths in the same age group. **One out of every ten RTI-related deaths among children aged between 0 and 14 occurred in India[12].** Proportion of all deaths due to RTIs is found to be higher among children above five years. RTIs accounted for 1.6% of all deaths among children aged between 1-4 and 4.8% among children aged between 10-14. RTIs are the 7th leading cause of death among children aged between 10-14, as of 2016[12], with a mortality rate of 4.5 deaths per 100,000 people in the same age group.

At the national level, police records serve as the major data source for fatal RTIs among children. This data is published by the NCRB as well as the MoRTH. These studies, however, suffer from under-reporting and hence, data on deaths occurring post hospitalization and data on mild, moderate and severe injuries is not accounted for in police records.

Figure 12: Fatal RTIs in India: NCRB and MoRTH data



- Denominator <14-year deaths: 15,096; <14 years, >18 years: 22,934
- 0-18 years: 38,030 deaths due to unintentional injuries in India in 2015

With source of data being the same, variations in reported deaths between NCRB and MoRTH reports are significant. Fatal RTIs accounted for 41% (15,633 deaths) of all unintentional injury deaths among children aged between 0-18 years[23]. Based on the same data source, MoRTH reported 9,408 deaths due to RTIs among children aged between 0-18 years in India in 2017, accounting for 41% of all injury-related deaths among children. In 2015, the NCRB reported 5,126 RTI-related deaths among children aged between 0-14 years and 10,507 deaths among children aged 14-18 years, accounting for 34% and 46% of all unintentional injury deaths in corresponding age groups [Figure 12]. **Four out of every ten injury-related deaths among children in the age group of 0-18 years in India are due to RTIs.**

- Data sources from population-based studies indicate that RTIs accounted for 16.7% of all unintentional injury deaths among children (0-14 years) with a mortality rate of 16 deaths per 100,000 people[24].
- Other population-based studies from different parts of India indicated that the incidence of non-fatal RTIs varied from 7%-35% of all unintentional injuries among children[40, 41, 45, 48].
- Evidence from autopsy studies indicate that RTI-related deaths accounted for 36% of all injury-related deaths[50] and 2.3-3.4% of all fatal head injuries in children under the age of 10[50-52].
- Data from NIMHANS revealed that 36% of all fatal injuries among children under the age of 18 were due to RTIs (n=250). Among non-fatal injuries, 42% were due to RTIs[25-27] (Annexure Table 3).

Non-fatal RTIs

Even though hospitals, in the public as well as private sector, provide care for the injured, non-fatal RTI information is limited due to lack of injury surveillance systems in India. Information regarding non-fatal RTIs, treatment and outcomes are mainly available from various research studies. NIMHANS studies estimate that for every fatal RTI, there are an estimated 30 serious and 70 mild non-fatal RTIs in India[60]. It is estimated that 468,990 serious non-fatal RTIs and 1,094,310 moderate to low non-fatal RTIs occurred among children aged 0-18 years in India in 2015[23].

Available data indicates that:

- Injuries among all age groups constituted 20–30% of ER registrations and 9–10% of admissions and 40–50% of deaths in hospitals. Among 16,711 injured children (0-18 years) admitted in different hospitals in Bengaluru, 42% of the hospitalizations were due to RTIs[25]. Children under the age of 18 constituted nearly 10% of deaths and 15% of injuries in hospitals in Bengaluru[25, 53];
- RTIs accounted for 11% of all trauma-related admissions among children in the age group of 5-14[54]. Nearly 20% of children hospitalized with traumatic brain injuries were under the age of 15. Around 85% of admissions were due to complicated injuries, while 15% of RTI admissions were due to simple injuries[55];
- Among surgical admissions requiring intense management, 43% of children (0-18 years) were admitted in surgical trauma units due to RTIs [56].

Disabilities and RTIs

Data regarding RTIs and disabilities specific to children is limited. GBD (2017) estimates indicated that among children aged 0-14 years, nearly 917,225 DALYs were lost due to RTIs in India in 2016, accounting for 10% of all DALYs lost worldwide. Loss of DALYs was more in children aged 5-9 years[12]. Studies that are available indicate that:

- Among persons admitted and treated for RTIs in tertiary care hospitals, nearly 13% developed a disability at the end of three months from the date of discharge. Twenty two percent among them were children aged 0-14 years[57];
- The rate of permanent disability among children aged 1–17 years in RTIs alone was 20/100,000 children. For every death, nearly four children were permanently disabled as per studies in the Asian region[58];
- The 3 year Traumatic Brain Injury (TBI) registry at NIMHANS found that 26% of children with a brain injury had difficulties performing day-to-day activities approximately four months post discharge[20]. Nearly 60% of these TBIs were due to RTIs[32];
- The Asian survey indicated that nearly one third of injured children missed school and had sought treatment[58]. In Bengaluru, 13% of children could not attend school for more than a month, among which 3% of them could not attend school for more than six months[25, 58].

Risk factors

Age and gender

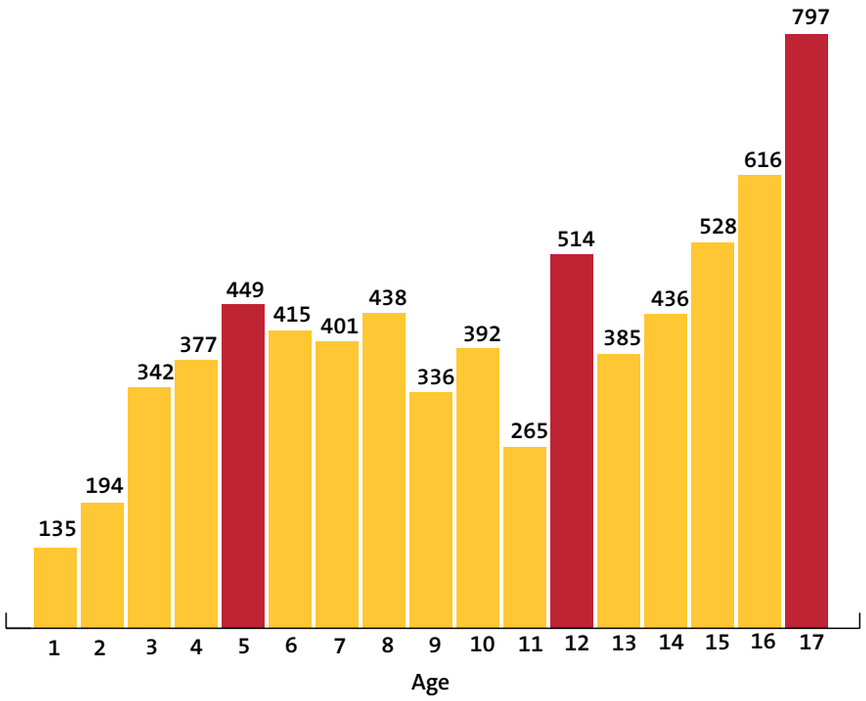
Among all childhood RTI-related deaths, the highest number of deaths were reported among children above 10 years[12, 23]. RTIs accounted for 4.8% of all deaths among children aged between 10-14, higher than 1.6% among children aged 1-4 years[12]. Data from NCRB (2015) report reveal that the number of RTI deaths were highest among children aged between 14-18, accounting for 67% of all RTI-related fatalities among children aged 0-18 years in India. The RTI mortality rate per 100,000 people among children aged 0-14 years was 26.3 per 100,000[24].

As children get more exposed to traffic environments, the corresponding rise in the number of deaths and injuries indicates the lack of proper child road safety programmes. Data collated from three studies conducted by NIMHANS indicate a bimodal distribution in RTI-related fatalities from infancy to adolescence. The first peak is observed at around five years of age when a child begins to move around but is still under the supervision of his/her parents. The second peak begins around the age of 12 when a child becomes far more independent. As the child grows older, his/her level of independence correspondingly increases[25] (Figure 13). Non-fatal RTIs were also higher among children aged 10-18 years (56% of all RTIs).

Data of 250 fatal RTI crashes from NIMHANS studies (BISP) indicated that male children accounted for 73% of all RTI-related deaths and 31% of all RTI deaths[25, 27].

Evidence from research studies indicate that 71-78% of all hospitalizations[54-56] and 77-93% of all RTI ER admissions among children comprised of males[54-56, 59]. Nearly 86% of all children admitted with complicated injuries were also males. It is clear that male children above the age of 10 are more prone to RTIs, fatal and non-fatal. Studies indicated that 85% of RTI injuries were complicated and involved a higher number of male children[55].

Figure 13: RTI among childrens <18 years (NIMHANS data)



Type of roads

As per studies, fatal RTIs among children were more common on city roads (45%) followed by highways (21%). Non-fatal RTIs were also more on city roads (67%). RTIs on highways were lesser among children than adults. However, fatalities were more in number on highways. The number of deaths on highways were found to be higher in rural areas. (Figure 14 and 15)

Figure 14: Places of RTIs in children (<18 years) - NIMHANS data (n=250)

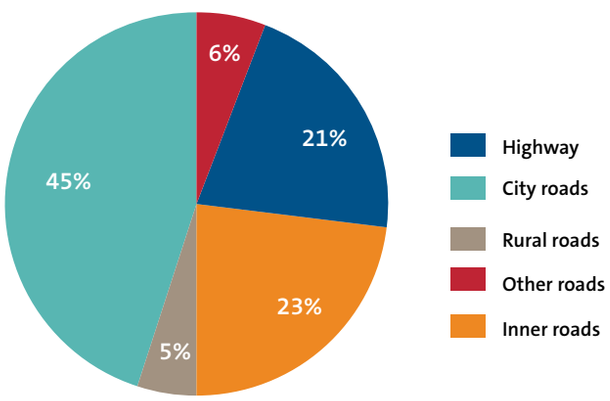
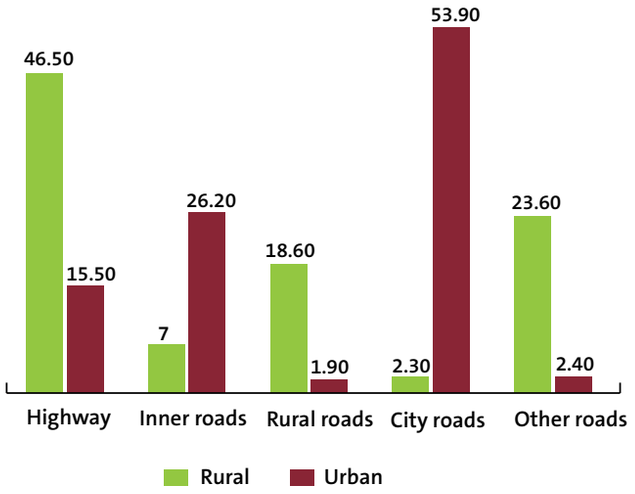


Figure 15: Places of fatal RTIs in children (<18 years) - NIMHANS data (n=250)



Vulnerable road users

A child - as a pedestrian or a passenger - is highly vulnerable to fatal and non-fatal RTIs. Pedestrians, cyclists and two-wheeler users collectively account for 85% of all fatal RTIs among children in Bengaluru [25]. Data from hospitals indicate that nearly half of all fatal (51%) and non-fatal RTIs (45.2%) involved child pedestrians[25]. Cyclists and two-wheeler users account for 23% and 11% of all fatal RTIs among children[25]. [Figure 16] Inbaraj et al[45] from Vellore reported that 87% of all non-fatal RTIs were among bicycle users and 12.5% among motorcycle users in the age group of 0-14 years[45]. In a study of non-fatal RTIs among 0-14 year old children, it was observed that nearly 82% of victims with serious injuries were pedestrians[55] (Figure 16.1).

Other risk factors among children

While all children use roads, children above 16 (in India) are legally permitted to drive a two-wheeler. Among 2,060 child RTIs, it was observed that only 13% of children used helmets[28]. As most deaths in India occur among pedestrians, factors such as walking in a mixed heterogeneous traffic environment, not wearing reflective clothing, lack of playgrounds, sidewalks and bicycle lanes, impaired driving due to alcohol and other substances, distracted driving due to cell phone use, reluctance/refusal to use seatbelts, helmets and/or child restraints, high-speed traffic and limited public transport are some of the other key risk factors[60, 61]. Other macro issues like poor supervision, faulty road design, limited infrastructure, unsafe vehicle design, poor traffic law enforcement and limited awareness result in increased chances of RTIs. Data on these factors and involving children is not available.

Figure 16: Child deaths by roads user type (n=250, <18 years) - NIMHANS data

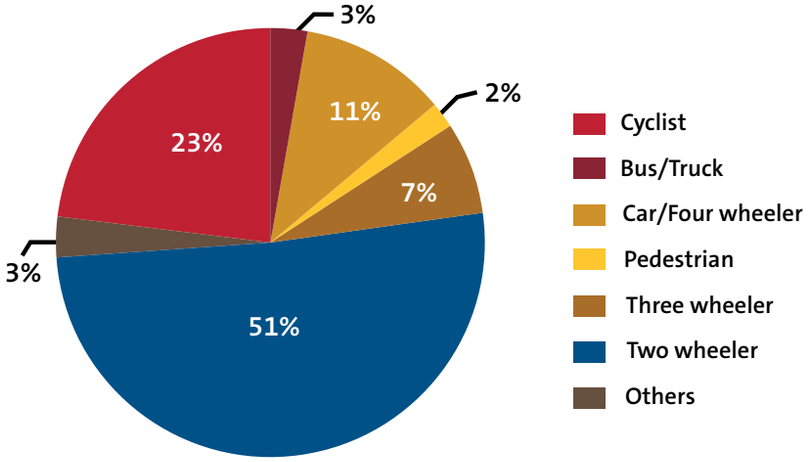
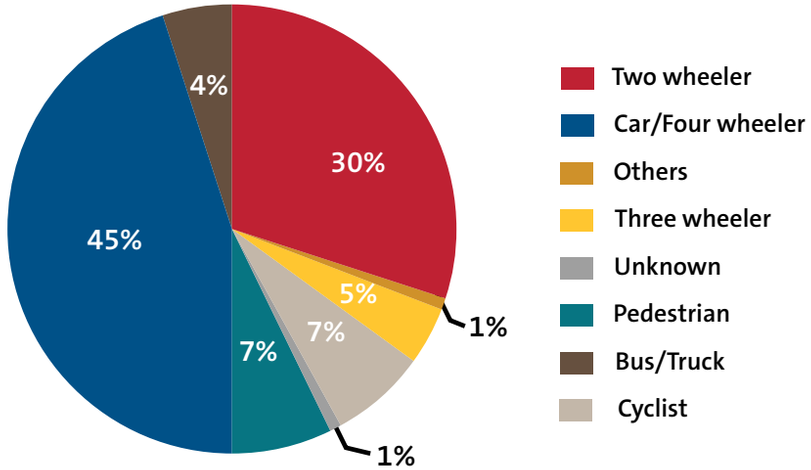


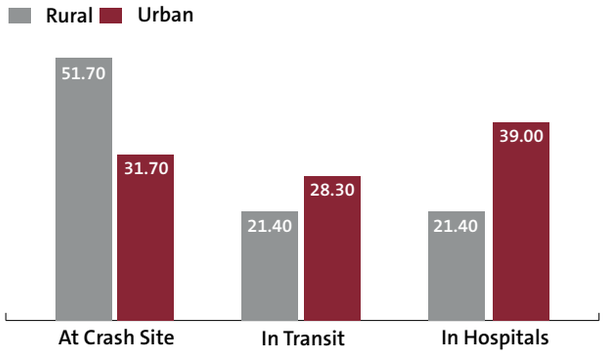
Figure 16.1: Non-fatal RTIs by road user type (n=7020, <18 years) - NIMHANS data



Place of death

The place of death is an indication for possible intervention in injuries and in particular for road crashes. Data pooled from research involving 250 child RTI-related deaths (0-18 years) from NIMHANS[25] indicate that 82.9% of deaths were reported from urban hospitals; hinting that data captures at these points was significantly higher. As per these reports, deaths at injury sites were higher in rural areas, whereas the percentage of total deaths was higher in urban hospitals[25] (Figure 17).

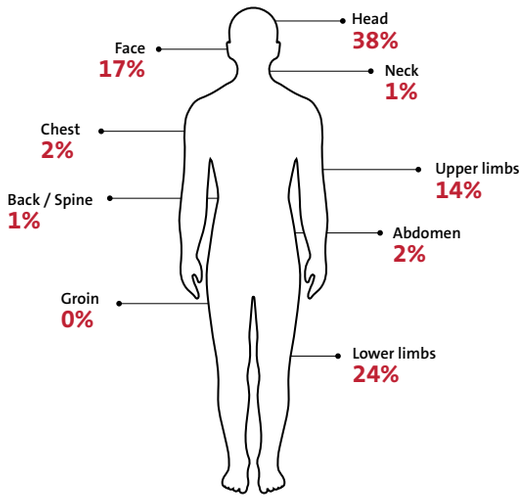
Figure 17: Place of death: Fatal RTI among children <18 years (n=250)



Nature of injuries

Data sourced from hospitals in Bengaluru indicate that traumatic brain injuries are the most prominent type of injury (53%) experienced by children, while 34% of injuries are found to be in the lower limbs. Around 20-23% of injuries are found to occur on the face and upper limbs (Figure 18). Polytrauma is also regularly observed, as per data from few studies.

Figure 18: Site of injury in fatal RTIs - NIMHANS data (n=250)



Management and outcome

First aid

In cases involving fatal crashes among children, 24% of children reported receiving first aid as against 66.4% children involved in non-fatal road crashes (n=6,805)[25]. Among those who reported receiving first aid, 65% received first aid at a nearby private hospital[25-27, 60].

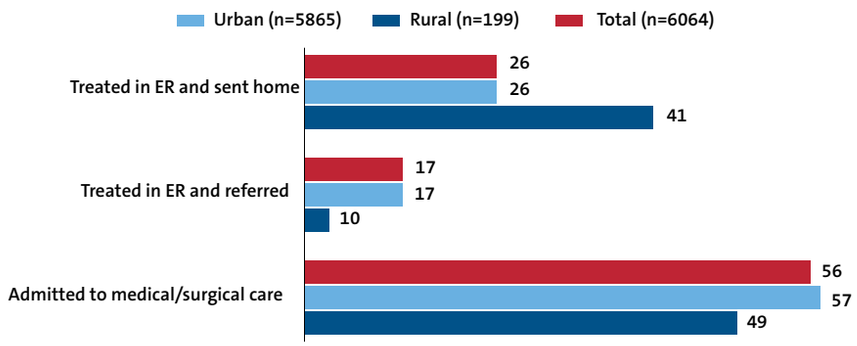
Transportation

Nearly 69% of all children with non-fatal RTIs were taken to the hospital in an ambulance while 20% were taken in an autorickshaw. The proportion of children transported in a 108 ambulance was more in rural areas (22.8%) as against those in urban areas (3.8%). Private vehicles and other ambulances were other common modes of transport for children with non-fatal RTIs[25].

Management and outcomes

89% of children with non-fatal RTIs were conscious at the time of hospitalization and nearly 4.8% were unconscious. Among 6,037 children hospitalized with an RTI, 46% sustained moderate injuries, 42% (<18 years) sustained mild injuries and 12% had severe injuries [25-27, 60].

Figure 19: Outcome of management in emergency room (<18 Years)(%)



Nearly 56% of non-fatal RTI patients (0-18 years) seeking care were admitted and 17% were treated in an ER and referred further for treatment. Nearly one fourth of all non-fatal RTI patients (0-18 years) were treated in and ER and sent home[25-27, 60] (Figure 19).

Among children with non-fatal RTIs undergoing treatment, it was observed that nearly 85% showed improvement, 8.3% were referred to other hospitals and 4% did not show any improvement despite the treatmen[25-27, 60]. Among persons admitted and treated for RTIs in tertiary care hospitals, nearly 13% had disability at the end of three months from the date of discharge from the hospital, of which 22% were children aged 0-14 years[57].

Good practice

School zone ahead signboard

School initiative to appoint traffic leaders

Bad practice

No school zone signboard installed

Vehicles parked near school despite signboard

THE TIMES OF INDIA

Jan 5, 2019, 17:00 IST

Six children, driver killed as school bus falls into gorge in Himachal Pradesh

SHIMLA: Seven people, including six schoolchildren, were killed and 12 injured on Saturday when a private school bus rolled down a deep gorge in Himachal Pradesh's Sirmaur district. The accident occurred in Sangrah town around 8 AM. A private bus carrying students of DAV School, Renuka, fell into a gorge.

BBC NEWS

26 April 2018

Thirteen children die as India school bus hits train

UTTAR PRADESH: The bus had been travelling across an unmanned railway crossing when the accident took place in Northern Indian state of Uttar Pradesh. their school bus collided with a train.

6. Fire related injuries

A burn is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals. Thermal (heat) burns occur when some, or all of the cells, in the skin or other underlying tissues are damaged/destroyed by hot liquids (scalds), hot solids (contact burns) or flames (flame burns)[62]. Burn injuries can be unintentional, accidental or intentional (more common among adults). Electrical injuries occur when children come in sudden contact with live electrical objects. Children are highly vulnerable to burns whenever they are close to a fire, accidental fire or spillover of liquids. They are equally vulnerable when their clothes catch fire and in instances where the caregivers possess limited knowledge or risk-taking nature.

As per the GBD report of 2017, an estimated 23,100 children (0-14 years) died globally due to burns, accounting for 2.81% of all cause deaths and 8% of all unintentional injury deaths. Death rate in LMICs were nearly 11 times higher as compared to HICs[62]. A significant number of DALYs are lost due to burn injuries, accounting for 2.14% of all DALYs lost due to injuries among children aged 0-14 years[12].

India

Table 10: Mortality due to burn injuries in India (NCRB-2015)

Type of burn	<14 years	14-18 years	0-18 years
Accidental explosion	31 (2.3%)	60 (2.7%)	91 (2.5%)
Accidental fire	777 (58.4%)	1329 (60.4%)	2106 (59.7%)*
Firearm	13 (9.7%)	30 (1.3%)	43 (1.2%)
Electrocution	509 (38.2%)	778 (35.4%)	1,287 (36.4%)
Total burn deaths	1,330 (37.7%)	2,197 (62.3%)	3,527 (100)

*335 were due to cooking gas/stove/cylinder burst

In 2015, 3,527 children aged between 0-18 years died due to fire related injuries in India, of which 2,197 (62%) were aged between 14-18 years[23] (Table 10). Fatal burns accounted for 8.8% of all unintentional injury deaths among children aged 0-14 years and 9.5% among those aged between 14-18 years[23]. NIMHANS studies, based on police records, reported that fatal burns accounted for 11% of unintentional injury deaths among children below 18 years.

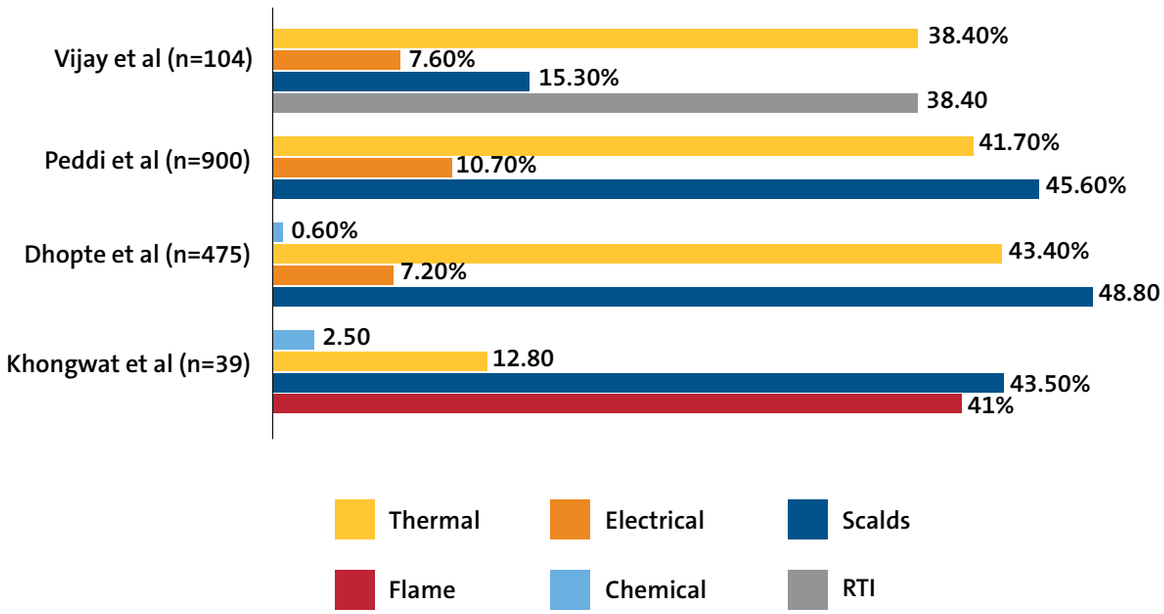
Population-based studies revealed that fire-related deaths among children (0-14 years) occurred at the rate of 3/100,000 children aged 0-14 years in India[24], accounting for 3% of all unintentional injury deaths. This is much lesser than the 9-11%, shown by studies based on police records. Burns, in several cases, can also lead to disability. Incidence of non-fatal burns injuries among children aged between 0-14 years is estimated at 6,500/100,000 children[47]. Nearly 0.32 million DALYs were lost due to burns among children (0-14 years)[12].

Hospital-based studies indicate that paediatric burns (0-14 years) constituted 9-21% of all admissions and 9.4% of all deaths in burns units. For every 100 admissions in a burns unit, 9-21 cases were children under the age of 15[63-65]. Fatalities due to burns varied between 20-60%, depending on the severity of burns[63, 64, 66-68] (Annexure Table 4). Fire-related injuries, especially to the eye, is a common occurrence in India during festive seasons. Data from a tertiary ophthalmology institute indicated that 20% of ocular trauma seen in ER was reported due to firework-related injuries and the prevalence of unilateral blindness among these cases was observed to be 8%[69].

Types of burns

Accidental fires accounted for 59% of burns deaths followed by electrocution (36%) among children (0-18 years)[23]. Data from hospitals reveal that scald injuries (43-48%) are the most common type of burns attended to in hospitals, followed by flame burns (38-41%), thermal burns (12-43%), electrical burns (7-10%) and chemical burns (0.6- 2.5%)[65, 67, 68, 70] (Figure 20).

Figure 20: Types of burns: Hospital-based studies

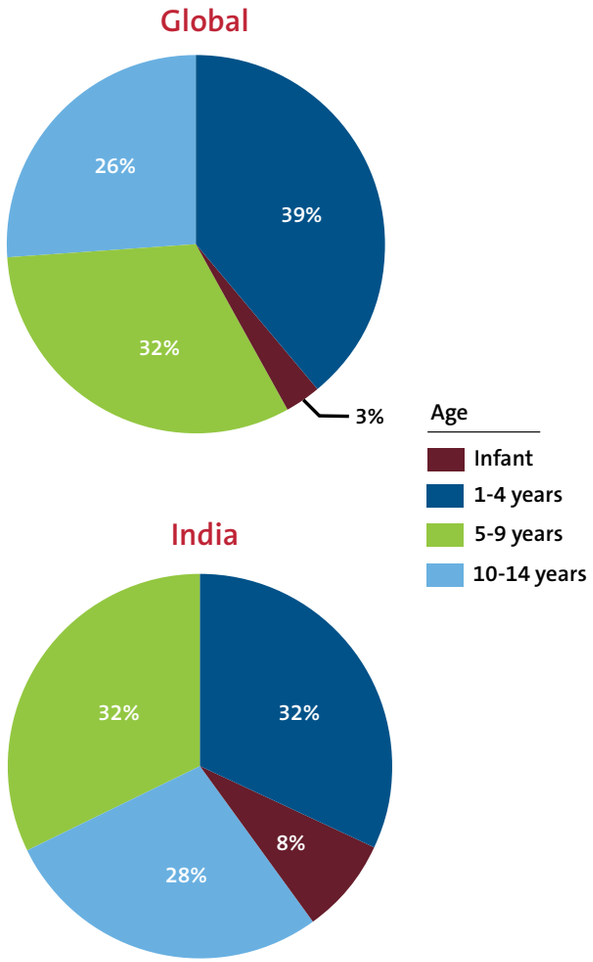


Risk factors

Age

Children aged 1-4 years accounted for 51.2% and 38.4% of all burn-related deaths globally and in India [12]. The Medical Certification of Cause of Death data revealed that 42% of burn-related deaths occurred among children under the age of 5[20]. Data collected from 25 hospitals under the Bengaluru Injury Surveillance Programme (BISP) revealed a higher fatality proportion (41%) among children (14-18 years) as compared to children in the age group of 0-4 (26.5%). Independent studies on hospitals (Burns Unit) clearly indicate fatalities due to burns to be higher among children under the age of five years, accounting for 43-52% of all burn deaths in children[63, 67, 68] (Figure 21).

Figure 21: Age distribution of fatal burns: Global, India



Gender

Females accounted for 52% of all burn deaths in India[12, 20]. The burns mortality rate per 100,000 people was found to be higher among females (4.2) than among males (1.8)[24]. Hospital data revealed that case fatality too was higher among females[66] than among males (26.3%).

Urban-rural distribution

Data from hospitals indicate that fatality due to burns were found to be more in urban areas (54.5-60%) than in rural areas[26, 28, 53, 71]. This is attributed to the availability of better treatment and increased referral for treatment to urban areas.

Location of injury

The trunk is a commonly affected region in cases of fatal child burn injuries (51.3%). This is followed by limbs (25.4%) and the head/neck (23%)[68]. Data from NIMHANS revealed that nearly 41% of all fatal burn injuries were noticed in the trunk, head, neck and/or abdomen.

Other risk factors

There is a higher risk for fatal burn injury among females and children from LMICs[62]. Nearly 70% of all fatal burns occurred at homes, implying the need for fire safety at homes. Poverty, reliance on fossil fuels in low-income households, heating/cooking on open fires, use of flammable substances such as kerosene, paraffin and fireworks are some of the risk factors causing fatal burn injuries[62].

Living in overcrowded dwellings, failure to supervise children, absence of laws and regulations on building codes, lack of smoke detectors and flammable clothing are also closely associated with the risk of fatal burn injuries among children. Research data from hospitals revealed that deeper burns, more skin surface area, positive wound cultures, inhalation injury and girl child being more susceptible to burn injuries were factors associated with increased fatalities among children in burns units[25-27, 60-66].

Outcome of burn injuries

Age, gender, place, type of burns, body area, extent and severity, availability of first aid, management facilities and practices are some of the factors that determine the outcome of burn injuries. Studies indicate that children account for 10–20% of patients in hospital burn units.

As healthcare facilities are better in cities, most children, residing in rural areas, are forced to travel to urban healthcare centres, thereby delaying definitive care. Most people are unaware of first aid practices such as application of cold water and hence, end up resorting to other ineffective measures. NIMHANS data indicated that nearly 51% of children with fatal burns availed first aid services [25] and 13.8% of them died at the site of injury. Only half of affected children admitted to burns units were brought in directly, while 47% of them were referred from other hospitals/clinics[66, 67]. The mean Total Body Surface Area (TBSA) in cases of fatal burn injuries was 62%. Higher the TBSA, higher the risk of mortality[67]. Mortality was significantly higher (74.3%) in patients with inhalation burns. Among children admitted with burns, case fatality varied between 20-60%[63, 64, 66-68]. Majority of children with severe burns, if they survive, are forced to live with disfigurements, contractures and disabilities.

Good practice

Fire extinguisher in school

Fire extinguisher alert

Bad practice

Broken switch board in school

Unprotected corrossive acids in labs

THE NEW INDIAN EXPRESS

May 25, 2019 7:21:39 am

Surat coaching centre fire: 20 students killed, some fell to death

SURAT: At least 20 students were killed on Friday after a massive fire engulfed a three-storey commercial complex in Surat. Some of the students, the youngest aged 4 and the oldest 21, died when they jumped off the building while most could not escape and were killed by the fire. The fire broke out around 5 pm on the roof of the Takshashila complex, which had covered the terrace to run summer classes for students along with other coaching centres. This space, run by various operators, had a fashion designing class, a class for mental mathematics and a gymnasium among others. Once the fire started, it quickly enveloped a wooden stairway — the only access to the summer classes on the terrace forcing students to plunge out of windows and the roof. Officials said that those killed in the blaze were aged between 15 and 21 years apart from a four-year-old girl, who is yet to be identified. Of the 20 victims, police have identified 17 bodies.

THE TIMES OF INDIA

Jun 5, 2019, 6:47 IST

Live wires powering CCTVs in school kill 8-year-old boy

BENGALURU: Live wires powering CCTV cameras and drawn along iron grills in Konanakunte school claimed the life of an eight-year-old boy on June 1, cops confirmed. Students had a 20-minute break and Akshay was playing holding on to the iron grills in the first floor. The wires connecting CCTVs were all over the iron grill. Some of them were skinned due to the previous night's rain. Akshay was holding one such grill when he was electrocuted.

7. Drowning

At the global as well as the national level, drowning is one of the leading causes of deaths and hospitalization among children. Deaths due to drowning can be accidental, unintentional or intentional. Chances of death due to drowning are extremely high and very few survivors manage to reach the hospital. Drowning is a serious and neglected public health threat that claimed 372,000 lives worldwide, with more than 90% of these deaths in LMICs[72]. The GBD report estimated that 109,540 children between the age of 0-14 died of drowning worldwide, accounting for nearly 35% of all unintentional injury deaths. Death rates due to drowning were observed to be 14 per 100,000 children. Nearly 9.1 million DALYs were lost globally due to drowning among children aged 0-17 years[12].

India

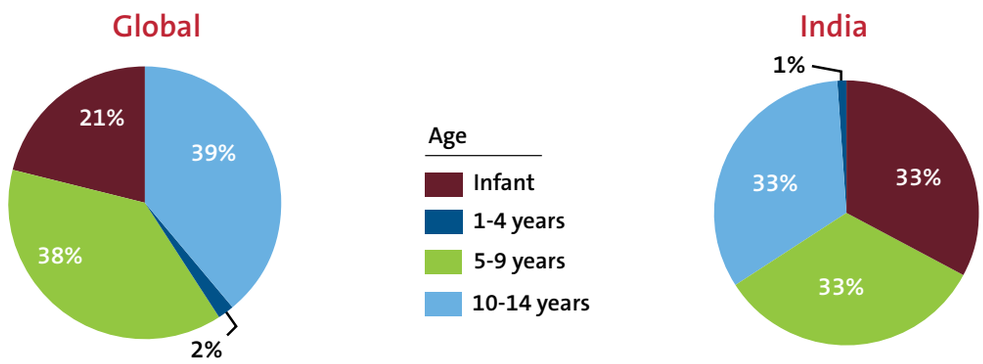
Estimates indicate that nearly 20,000 (19,736 as reported) children (0-18 years) died due to drowning in India. Nearly 1.6 million DALYs were lost due to drowning deaths among children aged between 0-14 years[12]. However, the NCRB data indicates 10,000 deaths (10,076 as reported) in 2015, indicating an under-reporting of 50% for drowning deaths[23]. Based on these reports, it is evident that drowning contributed for 26.4-34% of all unintentional child injury deaths in India[12, 23, 72]. NIMHANS studies reveal that drowning accounted for 14.4% of all child injury-related deaths. The death rate due to drowning in India varies between 6.4-14.3 per 100,000 children (0-14 years)[24, 73]. A large scale population-based study reported by Jagnoor et al indicated the mortality rate for drowning to be 6.4 deaths per 100,000 population (Male: 8.2, Female 4.6). A study by Dandona et al, place the rate of drowning deaths at 14.3 per 100,000 children (1-14 years) (Male: 11.8, Female: 11.1)[73]. Other research studies indicate that drowning accounted for 2.38% of all unintentional injuries among children[46, 71] and 10-41% of all domestic injuries[74, 75], implying that most fatal drowning cases among young children occur in domestic/residential environments. A study conducted in an emergency room (ER) of a tertiary care hospital in Delhi revealed that nearly 1% of all ER admissions was due to drowning[59].

Risk factors

The risk factors for drowning include age, gender and a host of contextual risks such as residence, occupation, alcohol use, epilepsy, water transport and/or easy access to water[72, 76]. GBD data indicates that nearly 54% of all drowning deaths in India occurred among children under the age of five, 26% among children aged between 5-9 years and 19% among children aged between 10-14. The percentage of deaths is higher among children under the age of five. As per NCRB reports, drowning accounted for 41% and 16.8% of all injury deaths in the age groups of 0-14 and 14-18 respectively[12, 23].

However, data from other sources (NIMHANS and independent studies) indicate that 60-70% of all drowning deaths and cases occurred among children above the age of 10[25, 26, 77] (Annexure Table 5). The death rate per 100,000 people was higher among children under the age of five (18.5 per 100,000) as against children between the ages of five and nine (14.2 per 100,000) and between the ages of 10 and 14 (3.1 per 100,000)[24]. The death rates and DALYs are higher in younger age groups, whereas the number of deaths is higher in children above the age of 10 (Figure 22).

Figure 22: Deaths due to drowning among children 0-14 years: Global and India (GBD 2017)



Gender

Available data from multiple sources indicate that death rates and DALYs are much higher in males, more so among infants. This gap decreases after the 10 year mark, but is still nearly four times higher among males as compared to females. NIMHANS data indicated that drowning death rates among males across all age groups was much higher (70-72%) than among females (28-30%).

Urban-rural distribution

Drowning death rates per 100,000 children was higher in urban areas (22.5) as against rural areas (10.6)[73]. NIMHANS data also indicated that 88% of drowning deaths occurred in urban areas.

Location of injury

Primary data revealed that a high proportion of drowning deaths among children were found to be around the wells/lakes (78%)[25, 26]. Nearly 4% of drowning deaths occurred in homes and involved children under the age of five. This trend indicates a pressing need to restrict a child's access to water sources within a residential environment. Data from few other research studies showed that drowning deaths were found to happen more in ponds (36-37.7%) than in wells (0.6-4.9%)[75, 77].

A population-based study in a rural community in Vellore revealed that nearly 90% of drowning deaths among children aged 1–12 years involved water in a pit, well or pond[78]. Population-based studies revealed that nearly half of the children drowned in a river (48.3%), followed by drowning deaths in ponds (19%), water pits (17.2%) and other water bodies (15.5%) including wells, canals, tanks and sewers[73] (Annexure Table 6).

Other risk factors

Factors such as consumption of alcohol before accessing a water source, continued access to water sources and co-morbidity could also lead to drowning[76]. Indian studies report the act of playing near a water source too as a risk factor.

Outcome

It is reported that nearly 32-43% of the victims received first aid at the site of injury[25-27, 71]. Outcomes revealed that nearly 91% of all deaths occurred at the site, 3% during transit and 6% in hospitals. Trend data from a few studies revealed higher rate of fatalities among children drowning at the site of injury[73].

One Sunday morning Rakesh, Bharath and Karthik (names are changed) studying in a private school in Kolar thought of spending their holiday by playing together. They all went to nearby river banks to play. Among the three boys Rakesh expressed his desire to get into the water much against the opposition of other two boys. He was adamant and entered the river with no experience of swimming. Within no time he could not balance himself and fell into the current of water flow. He was struggling to find balance and started screaming for help. Witnessing this sight the other two were frightened and Bharat couldn't resist himself from helping his friend Rakesh. He leaned forward towards the water and lent his hand for Rakesh's rescue. Bharath lost control of himself as soon as his hand was pulled by Rakesh and he also fell into the water. The sight of two friends being in trouble made Karthik to rush for their rescue, but in vain. He also fell into the water and was carried away by the water current. Within a span of few minutes all the three friends lost their lives by drowning. The three lives would have saved if they knew swimming or if they had been supervised by any of the responsible elders.

THE TIMES OF INDIA

Apr 9, 2019, 9:08 IST

Boy drowns in Mumbai civic pool in first swimming lesson

MUMBAI: An eight-year-old boy who enrolled for swimming training in his summer vacation drowned on the first day of his lessons at the civic pool in Vasai on Sunday. Yug Ladhwa a Class III student who stayed in Vasant Nagri, Vasai (east) had finished exams on Friday and joined Vasai Virar Municipal Corporation swimming pool complex at Krishna Township for swimming classes. After an hour, parents and authorized elders were asked to pick up their children, however, when Yug's parents could not find their child, they began searching around the pool and in the locality. As they entered the pool area, they found a staff trying to revive him. Yug was immediately rushed to the nearby hospital where he was examined and declared dead. An autopsy at the primary health centre confirmed death due to drowning.

Good practice

Closed and locked sump in school

Bad practice

Open sump in school

DH DECCAN HERALD

APR 18 2019, 20:22PM IST

Safety of kids in pools calls for extra vigilance

With swimming camps and summer classes mushrooming across Bengaluru, parents need to stay alert. Metrolife spoke to trainers and parents about pool safety.

Deepali M K, Head of Laps Academy Bengaluru

Deepali is a national swimming medalist with 15 years' experience in coaching. Her academy provides swimming programmes and lifeguard training. "Pools have instruction boards with fancy lights but lack in adequate and trained staff," she says.

Koustav Bakshi, Project manager, Life-Saving Mumbai

Koustav is certified by Rashtriya Life Saving Society (India) and has conducted training in Bengaluru on trauma management, CPR among other life-saving skills. He emphasises the importance of trained lifeguards and instructors. "Trainers and lifeguards must know how to give CPR and know when not to carry a person without proper stretchers. Randomly picking a drowning person can lead to nerve damage. Only professionals who know this must be allowed near the pool," he says.

Imran Noor, Project manager

Cleanliness of the pool, CCTV cameras, and the number of trainers should also be taken into consideration, he says. Imran believes a parent must always be with the child for the entire period of training.

Sivadasan P, General manager, Koramangala Club

Koramangala Club has outsourced swimming training to a reputed team. "We have certified lifeguards and trainers and ensure the children are safe all the time," Sivadasan says.

Chlorine testing

A pool must have rescue tubes, ropes, poles and rescue floaters, spine boards, and first aid kits. The chlorine level should be between 7.2 and 7.6 pH; this can be tested using a chlorine test kit that costs Rs 500 to Rs 750 online.

8. Fall injuries

Fall injuries are common among children due to a combination of several physical, social, cultural and environmental factors. As a child grows, fall injuries become prominent and are influenced by several macro and micro factors. Most minor fall injuries go completely unnoticed in official reports. As with other types of injuries, fall injuries could result in disabilities and the sequelae can leave the child severely handicapped for the rest of his /her life, imposing a huge burden on the child and his/her family.

According to the WHO, a fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower levels[83]. The GBD report (2017) estimated that falls among children (0-14 years) accounted for 33,267 deaths and 3,608,307 DALYs worldwide[12]. (Table 11) Most of these deaths were reported in LMICs.

India

In India, 2,344 deaths due to falls among children (0-18 years) were reported in 2015. These accounted for 6.1% of all injury-related deaths[23]. Among those aged 0-14 years, falls accounted for 7.7% (1,164 deaths) of all injury-related deaths. The MDS, a large scale population-based study, indicated that falls accounted for 10% of all child injury-related deaths in the age group of 0-14[24]. The standardized mortality rate due to falls is estimated at 5.4 (CI=4.4-6.3) deaths per 100,000 population (children (0-14 years)[24]. Data pooled from epidemiological studies of injuries, and examined exclusively for child injuries, revealed that 2.8% of all child injury deaths were due to falls[28]. Hospital-based studies indicate that falls accounted for 17-27% of pediatric hospital admissions in departments of orthopedics and pediatric surgery respectively[56]. Falls accounted for 17% of pediatric ICU admissions[80], in a study of 400 children admitted to hospitals. Apart from deaths, incidence of non-fatal fall injuries was estimated at 2.35%[47]. Among children under the age of 5, falls accounted for 47-66% of all injuries[46, 75]. Data on non-fatal injuries from NIMHANS (0-18 years) indicated that nearly 23% of all injuries were caused due to falls. Nearly 3.6 million DALYs were lost worldwide due to falls and India accounted for 30% of all DALYs lost globally (1.1 million).

Table 11: Deaths due to falls among children

Age	Male	% of all cause deaths	Female	% of all cause deaths	Total	% of all cause deaths
GLOBAL						
Infant*	4,907	0.2	4,697	0.3	9,604	0.4
1-4	6,498	0.9	4,287	0.6	10,785	0.8
5-9	4,369	2.0	2,258	1.2	6,628	1.6
10-14	4,630	2.5	1,617	1.2	6,248	2.0
Total	**20,406**	**0.6**	**12,861**	**0.4**	**33,367**	**0.5**
INDIA						
Infant*	2,176	0.5	2,801	0.7	4,977	0.6
1-4	1,731	2.4	1,748	2.0	3,479	2.2
5-9	1,022	2.5	805	1.6	1,827	2.0
10-14	1,162	3.3	649	2.0	1,812	2.7
Total	**6,092**	**1.0**	**6,005**	**1.0**	**12,097**	**1.0**

*Infant - early neonatal, late neonatal and post neonatal

Risk factors

Age

Falls (fatal and non-fatal) and death due to falls is commonly observed among children under the age of five. This could be attributed to their developmental process wherein they begin to walk and hence, are more susceptible to falls. The GBD estimated that 69% of all fall deaths among children involved individuals under the age of five. National report of cause of death (MCCD) indicated that 56% of deaths were among children under the age of 5. On the contrary, reports based on police records[23] indicate that children (14-18 years) accounted for 81% of all deaths due to accidental falls. Population-based studies indicated that 31.9% of all fall injuries were reported in the age group of 0-4 years[47]. Hospital-based studies also indicate higher incidence of falls among children under the age of five (47-66%) (Annexure Table 7). The death rate per 100,000 people was also higher in children under the age of five (177 per 100,000 in early neonatal age and 19 in late neonatal and 17 in post neonatal and five per 100,000 between 1-5 years of age)[12].

Gender

Fall injuries, deaths and DALYs were reported to be higher among males[12]. Multiple data sources indicate higher deaths and injuries among males as compared to females. The mortality rate due to falls was found to be higher among males (5.7 per 100,000) than among females (5 per 100,000)[24, 42]. Evidence from MCCD (66.5%), autopsy studies (60%)[81] and police records (77.8%)[25-27] indicate higher mortality rate due to falls among males. Falls in domestic environments were found to be similar across both genders (Male: 50.9% v/s Female: 49.7%)[44].

Urban-rural distribution

23.6% of all child injuries in urban areas were caused due to falls as against 9.9% of all child injuries in rural areas. **Nearly one out of every four child injuries in urban areas is due to falls[28].**

Place of injury

Nearly 61% of fatal fall injuries[25] and 64% of all non-fatal fall injuries occurred at home[59]. These injuries are more likely to occur with children below the age of five. Nearly 4% of non-fatal injuries occurred at school[59].

Types of falls

Fall from heights, balconies, rooftops, buildings are common in cities while a fall from trees and other places that are at a height are common in rural areas. Most falls among children (81.1%) are accidental in nature[23]. Majority of falls in a domestic environment (75-88%) occurred at the ground level[48, 79, 82].

Among cases involving hospitalization, falls from height (26%) and falls while walking (25.5%) were the most common types of falls[79]. Among fatal falls, the most common type of fall identified was a fall from a rooftop (38.5%) and balcony (24.1%)[81] (Annexure Table 8).

Other risk factors

Overcrowding, living in hazardous environments, sole parenthood, young maternal age, low maternal education, caregiver stress and mental health problems and inequities in access to healthcare are some of the other risk factors for fall injuries[83]. Falls at home are common among children due to the presence of products such as baby walkers, prams, toys, beds, etc.

Management and outcome

Nearly 62-69% of all fatal fall injury victims received first aid, of which 44% received first aid at the nearest government hospital[25-27]. Most deaths (76% of all fall-related deaths) occurred in hospitals and 21% occurred at the site of injury. The head and neck region (93.7%), followed by 25% of extremities were most common parts affected in fatal fall injuries among children[81]. Data of 3,215 non-fatal fall injuries seeking care in ER rooms from different hospitals[25-27] revealed that 55.8% of the victims were admitted in medical/surgical units, 23.3% were treated in and ER and referred and 20.9% were treated and sent back home. Among those hospitalized, 84% showed improved health, 1.2% died and 5% showed no signs of improvement/ worsened conditions.

Good practice

Grilled building

Soft flooring

Safety net

Grills in corridors

Bad practice

Low height corridors

Easy, unrestricted access to roof

THE NEW INDIAN EXPRESS

Thursday, June 13, 2019

Noida: 2 students dead, 5 injured in Salarpur school wall collapse

NOIDA: According to police, around 15 students were sitting next to the school wall taking an examination. A construction vehicle was moving piles of sand which, police said, weakened the wall's structure, thereby aiding its collapse. Senior Superintendent of Police (Gautam Budh Nagar) Dr Ajay Pal Sharma said: "We received information in the morning about a school wall collapsing in Salarpur… It appeared that some construction activity was going on in the school's vicinity, due to the impact of which the wall gave way.

THE TIMES OF INDIA

January 28, 2019

Bengaluru: Toddler dies after falling from Namma Metro escalator

BENGALURU: Hasini, one-and-half years old girl who fell from an escalator at the Srirampura Metro station in West Bengaluru on Sunday night and landed on the road 50 feet below, suffering grievous injuries on her head. Police sources said the child was accompanied by her grandfather and grandmother. The elderly man was carrying the child in his right arm when the child slipped and fell.

THE NEW INDIAN EXPRESS

19th January 2019 02:30 AM

Baby dies after fall from balcony in Bengaluru

BENGALURU: An 18-month-old baby, who was rushed to hospital after falling from the second floor, breathed her last on Friday. The deceased was identified as Sophia, daughter of Balasubramanya and Lavanya, residents of Nanjundappa Layout in Begur. The incident occurred around 1.30 pm when the child was playing on the second-floor balcony. She fell down and was severely injured, after which she was shifted to a private hospital. However, the baby did not respond to treatment and died on Thursday evening.

9. Poisoning

Poisoning deaths can be accidental, unintentional or even intentional (among older children). Over time, poisoning-related deaths and hospitalizations have significantly reduced in HICs due to a number of preventive interventions and improved trauma care programmes. However, deaths due to poisoning are on a constant rise in India and other LMICs. Quality data to determine the extent of the problem and its determinants as well as its characteristics are unavailable in India. Data available at the national level is grossly under-reported and other individual studies have serious limitations.

Global

GBD data of 2017 estimated that nearly 13,359 poisoning deaths occurred among children aged 0-14 years worldwide, accounting for 0.22% of all cause deaths[12]. Nearly 44% of these deaths were reported among children aged 1-5 years, of which 1% remained critical[21]. More than 90% of fatal poisoning cases among children (94%) are reported from LMICs[21]. A significant number of DALYs (627.76 million DALYs) are lost due to poisoning, accounting for 0.18% (1.18 million) of all DALYs lost among children aged 0-14 years[12].

India

The GBD data for India indicates that nearly 1,749 deaths among children aged between 0–14 are due to poisoning. Incidence of poisoning deaths was 0.9 per 100,000 children under the age of 5 and 0.22 per 100,000 children between the ages of 5 and 14[12]. Current NCRB reports on poisoning cases among children under the age of 18 is available only for up to the year 2013[23]. With a reclassification of age and categories of injury-related deaths, data on poisoning-related deaths is unavailable for cases involving children under the age of 18.

Poisoning also accounted for nearly 0.12% of all DALYs lost among children aged 0-14 years (0.16% of DALYs lost among children (0-5 years) and 0.29% of all DALYs lost among children (5-14 years). The proportion of DALYs lost due to poisoning among kids (0-14 years) was higher among females (Females: 0.17%, Males: 0.16%)[12].

Apart from national level reports, a comprehensive health and injury survey in Haryana indicated that poisoning accounted for 0.33% of all childhood injuries[47]. The incidence of poisoning among the rural population is estimated at 20 per 100,000 children (0-14 years).

Hospital-based autopsy studies show higher figures across India, revealing that poisoning accounted for 6% of all deaths among children[84]. Nearly 1.6% of all pediatric hospitalizations were due to domestic poisoning[85], and 22% of all trauma related pediatric hospitalizations were due to poisoning[80]. Fatalities among those admitted varied between 1.4 to 5%[85-87] (Annexure Table 9). Data from the Bengaluru injury surveillance studies showed that cases of poisoning were more frequent in rural areas contributing for 9% of deaths and 22% of hospitalizations[53].

Apart from hospital and population based studies, an analysis of 2,720 poisoning telephone calls received by the National Poisons Information Centre (NPIC, AIIMS, Delhi) between 1999-2002, observed that 995 calls (36.6%) came from children. The study suggested that 37 out of every 100 telephone calls received were related to poisoning among children[88].

Risk factors

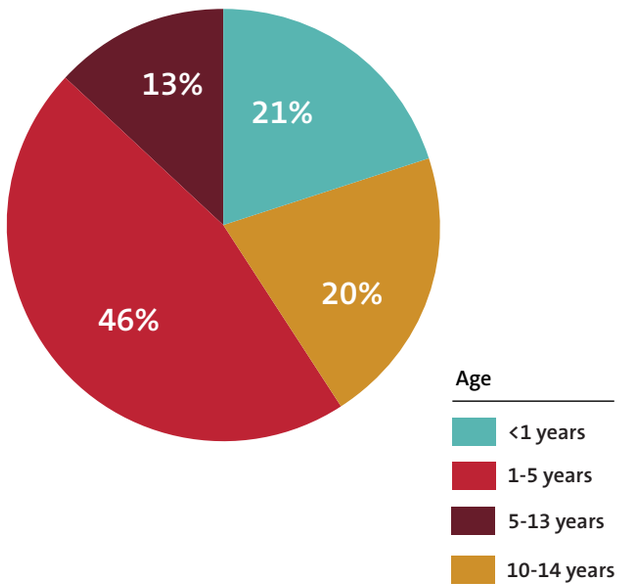
Age, poverty, lower socioeconomic status, being male and availability of dangerous substances are closely linked to cases of poisoning. Increased access due to improper storage of poisonous agents such as kerosene, insecticides and drugs is also a contributing factor. On a macro level, absence of clearly defined policies and regulations, weak enforcement of existing regulations, low literacy levels, improper storage and disposal policies are also risk factors for childhood poisoning[89].

Age

Understanding age differentials in poisoning deaths helps us identify determinants and plan age-appropriate intervention strategies. The GBD report indicates that 66% of poisoning deaths among children occurred among children under the age of five years[12] (Figure 23). The same is reiterated in the WHO Child injury report[21] and independent studies from different hospitals across India - which indicate that 34-62% of all poisoning-related deaths occurred among children <5 years. In contrast to the aforementioned observations, the MCCD report indicates that poisoning-related deaths are higher among children above the age of five[20].

The MCCD report also indicates that poisoning accounted for 0.3%, 0.9% and 2.3% of all deaths in the age groups of: <1 year, 1-4 years and 5-14 years respectively[20]. Evidence from hospital research[87, 90, 91] have revealed that 34% of all pediatric poisoning cases admitted in the ICU were under the age of five and 61% were between the ages of 11 and 18[90]. Other studies have shown that admissions in ICUs and ER rooms are higher among children under the age of five (34-60%) and among children between the ages of 11 and 18 (38-62%).

Figure 23: Age distribution of poisoning deaths - India (GBD 2017)



Gender

The number of poisoning deaths (Male: 939, Female: 810) and deaths per 100,000 people (Male: 0.9, Female: 0.22) was reportedly higher in males[12]. DALYs lost were higher among females than among males (0.17% v/s 0.16%). Most generic studies as well as studies focused on poisoning-related admissions and deaths in hospitals (62%) indicate poisoning-related deaths to be higher among men[84].

Place

Studies involving children seeking care in hospitals indicate that majority of poisoning cases occurred in rural areas (78.04%) and within homes (86.6%)[91]. An earlier review showed that more children died in rural areas due to poisoning than in urban areas[31]. Amongst all places, homes are a high-risk area owing to the presence of dangerous products being within a child's reach. Around 6% of poisoning cases are reported to have occurred in schools[74].

Type of poisoning

Studies indicate that detergents, cleaners (28%), medicinal drugs (17%), kerosene (14%) and mosquito repellents/pesticides (17%) are common agents found in poisoning cases involving children aged between 0-12[86]. Studies involving rural populations reveal that kerosene (36.58%), organophosphorus compounds (17%) and turpentine oil (18%)[91] are common products leading to poisoning. Drug-related accidental poisoning accounted for 21-36% of cases and involved consumption of anticonvulsants, thyroid hormones, benzodiazepines, analgesics and oral contraceptives[90, 92].

Treatment outcomes

Hospital-based studies indicate that nearly 44-47% of the affected children managed to reach a hospital within six hours after the event[87, 90]. Around 31-32% of victims reached a hospital within one hour of identification. Studies in ICU indicate that the average duration of hospitalization ranged from 0-6 days, with nearly 58% of cases being admitted for 2-4 days[90].

Admission in ER and wards indicate a median duration of three days admission for treatment and nearly 55% of affected children were admitted for 1-3 days[87]. Among those admitted, overall survival was witnessed in 84.56% of the cases and around 2-4.7% of the victims died during the hospital stay[86, 87]. Duration of admission and treatment outcomes are influenced by severity at the time of admission, type of poisoning, age of child and quality of emergency care. Evidence indicates better survival among children above the age of five.

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hindustantimes

May 10, 2017 22:11 IST

85 students fall ill after eating midday meal in Bihar school

BIHAR: At least 85 children fell ill on Wednesday after eating midday meal in a government school in Samastipur district of Bihar, officials said. "Soon after the children consumed their meal at a primary school in Akbarpur Pitaurdiya village, they complained of uneasiness, which led to vomiting and some students falling unconscious," a district official said. All the children were admitted to Sadar Hospital and later discharged, the officials said.

THE TIMES OF INDIA

OCTOBER 3, 2018

1-year-old girl who drank acid instead of water battling for life in Bengaluru

BENGALURU: The incident took place in Chinnappanahalli in east Bengaluru at 2pm when the family was attending a puja at a friend's newly built house. Payal's mother Gemini Devi had given her a biscuit and, after eating it the girl asked for water. When Devi found a half-filled bottle on a window shelf, she mistook it for water. Immediately after taking one or two sips, the child started screaming and fumes came out her mouth, to the shock of her parents. She was soon breathless. The doctors said the parents of Payal had brought the bottle to the hospital. " The bottle was a typical water container and bore a label "toilet cleaning acid'. We don't know exactly what chemical was in it but it was acid of some type. Parents have to be careful while administering anything to children," said Dr. Sujatha.

Section 2: School Safety - An Appraisal

Summary

We studied 131 schools which catered to 79,042 students. Nearly 69.5% of the schools provided education till the 10th standard. Playgrounds, play courts and swimming pool facilities are present in less than one fourth of schools, with playgrounds in higher proportion in rural schools (33.3%). Nearly three-fourth of the rural schools and 62% of the urban schools are located on the inner roads.

School safety guidelines and SOPs

- Only one-fourth of the schools had safety-related guidelines.
- Guidelines were reported to be more in private schools (31.4%) than in public schools (11.1%).

Safety education and training

- Safety education as part of the school curriculum was present in 37 (28%) schools.
- Almost 50% of schools reported that teachers and students had undergone the traffic safety training, more so from the urban schools (59%).
- Almost 30.8% of the rural schools and 19.8% of the private schools didn't have a single teacher who was trained in basic first aid.

School to parent connect

- Most schools used an SMS system to connect with parents (95%).
- Almost 78% of the schools did not have tie ups with nearby hospitals.

Spending on school safety

- School safety budget was not present in almost 88% of the schools.

School safety committees

- Safety committees were present in 64.9% of the schools. In 52.7% of the schools which had a safety committee, parents were also members.
- Nearly 35% of the schools reported there was no person-in-charge at the school level to manage safety.
- Nearly 89.1% of the urban schools have a CCTV camera facility as against 61.5% of the rural schools.

Physical infrastructure and safety

- Physical infrastructure with respect to the condition of windows in buildings and classrooms were good in nearly all the schools.
- Anti-skid flooring was present in 54.2% of the schools, but 92.3% of the rural schools did not have skid-resistant flooring.
- In 59.7% of the schools, there was an easy access to the roof.

Chemical safety

- Laboratories were not present in 22.9% of the schools. Among those present, 58.8% did not have exhaust fans.
- In more than half of the schools, the chemicals were not labeled properly and were not kept out of children's reach.

Transport safety

- Nearly 40.5% of the schools provided transport facilities for students by means of a school bus. A school bus facility was offered more in the rural (56.4%) than in the urban schools (33.7%).
- In 58.5% of the schools, the school buses had GPS trackers. Around 43.4% of the schools had installed CCTV cameras in their school buses.
- Nearly 40% of the schools had a transport safety manager (urban schools=42.4%, private schools=47.7%).
- In totality, 173 roads adjoining 131 schools were observed for road safety. It was seen that 17% of the roads had a school zone signage and 11.5% of roads have a speed limit signage. Speed breakers and footpaths were present in nearly half the roads observed.
- Of the 131 schools we studied, only 13% of the schools had roads which had a speed limit sign and 70 schools had roads where speed breakers were present.

Fire safety

- A fire safety certificate was found to be present only in 32.8% of the schools. Almost half (50.4%) the schools had never conducted fire safety mock drills.
- Emergency exits were present only in 22.1% of the schools.
- A fire extinguisher was present in 93.9% of the schools.

Emergency first aid

- Most schools (92.4%) reported providing first-aid services in school.
- Health records were present more in the public schools (71.1%) than in the private schools (59.3%). Health cards at the school level were observed to be present more in the schools of rural areas (71.8%) than compared to the schools of urban localities (59.8%).
- Most schools did not have a system for recording or reporting injuries (90.1% of schools).

Safety level (%) in schools

- Level of safety (%) for all schools was computed. The median safety level in the surveyed schools was 50.8%. The safety level was higher in the private schools (54.4%) than urban schools (50.8%).
- Safety level with regards to macro areas was 48%, suggesting a need to strengthen policies, safety committees, safety guidelines, training and budgeting aspects of school safety in public and private schools alike. This is a key injury prevention strategy.
- Road safety levels in the immediate roads of the school ranged between 16-33%, with a median value of 20.8%. It implies that most schools scored only 20.8% of the expected safety scores.
- Fire safety and first aid scores were also less than 50% of the expected scores. The safety level was 20% for fire safety and 40% for first aid management.
- Based on our appraisal, nearly 48.1% of the schools were graded as Grade C and Grade D (Safety level 50%-74% and 25%-49% respectively) and only one school was graded as Grade A+.

Indicators	
Percentage of schools scoring Safety Grade ≥A	0.8%
Percentage of schools implementing SOPs and guidelines (can be provided by state or developed within the school) for safety	24.4%
Percentage of schools with one or more dedicated and exclusive staff to manage safety activities	6.8%
Percentage of schools with formally trained teachers or staff in safety and injury prevention	23.6%
Percentage of schools with a fire safety certificate	32.8%

1. Introduction

"The real enemy of safety is not its non-compliance but non-thinking." - Dr Rob Long

Schools, by definition, are institutions where children express, explore and enrich themselves to become healthy and productive individuals. To achieve the same, children have constitutionally guaranteed fundamental rights[1] to education in a safe, protective environment that's conducive to their growth and development. Hence, it is the duty of all stakeholders to ensure school safety and prevent injuries among school children.

School safety is essentially the creation of safe environments for children, starting from their homes to their schools and back. This includes safety from large-scale natural hazards, human-made risks, and pandemics to less frequent instances such as violence, fires, structural damages, transportationa and other related emergencies[2].

School safety is indispensible and includes:

- Building safer environments for reducing injuries and accidents concerned with physical infrastructure;
- Providing safer transportation of children from home to schools and safe road behaviour;
- Preventing injuries arising from sports and other extracurricular activities; and
- Enforcing and enhancing safety behaviour whilst boosting overall wellbeing of children.

It is imperative that the aforementioned factors are addressed to reduce the risk of injuries in school and maintain the best possible level of safety[3]. Children spend a minimum of 6 hours per day in school for nearly 250 days a year, that translates to approximately 1,500 hours per year per child. For 10 years of schooling, every child spends nearly 15,000 hours in a school environment. Also, there are more children enrolling into schools every day.

The school gross enrolment ratio has increased from 81.6% in 2000-01 to 96.9% in 2014-15[4]. The number of children enrolled in public schools have increased from 247.9 million in 2011 to 261.9 million in 2016.

- In Karnataka, the number of children in schools increased to 10.92 million in 2015-16[2].
- According to the District Information System of Education (DSIE) report (2012), the enrolment of children from 1st standard to 10th standard in Bengaluru Rural was 1,45,306, Bengaluru North comprised of 5,55,621 students while Bengaluru South had 7,72,098 children enrolled in schools during the year.[5]
- The number of students enrolled, and the expected enrolment in private sector schools, is much higher and details for the same are not easily available.

The aforementioned points further illustrate why school safety is indispensable.

Children, by nature, are physically active and when left unsupervised and are more prone to risk-taking behaviours and injuries.

These injuries could also have serious adverse effects, given their physical and physiological makeup. Due to their relatively soft body structure, **mortality, morbidity** and **disability** caused by these injuries are relatively higher in children compared to adults.

School environments, too, are ever-evolving: newer models of education encourage more competition and expose children to environments such as play areas, swimming pools, gymnasiums, laboratories, etc. As a result, children come in contact with several people (school staff, caregivers, etc.) and objects (chemicals, vehicles, toys, etc.) each of which could lead to bodily harm.

As discussed in the previous sections of the report, childhood injuries could leave a huge physical and/or psychological impact on children and their families. They could affect their cognitive and functional abilities and consequently, affect their growth and performance. The economic and societal impact could be devastating for families too, due to increased/incidental expenses.

Research indicates that RTIs (Road Traffic Injuries) and sports injuries are common unintentional injuries reported among school children. RTIs were reported by 17% of children aged 11-14[98,99]. Sports injuries were reported at a rate of 48 per 1,000 hours of school time[100, 101]. Apart from injuries that occur within the school premises, other unintentional injuries such as burns, poisoning and drowning related injuries were found to be common among school children. Previous studies have revealed that dental injuries among children range between 7% and 15%[102, 103].

Safety in schools is a byproduct of an interplay and coordination among government bodies, education departments, schools, teachers, parents, children and society at large. A paradigm shift has been observed in the past decade with regard to the role of health, safety, injuries and survival of children in schools. Research, interventions and surveillance in schools have also increased for a host of health and social problems. However, implementation of safety policies and programmes continue to be a challenge due to lack of coordinated mechanisms.

2. Importance of school safety programmes

Primordial prevention is the best form of health promotion. Addressing risks and helping children internalise safety can have a lasting impact on their adulthood as well. However, implementing community level safety interventions for children are thwarted by challenges such as limited resources and incomplete coverage. Also, with the increased demand for schooling, safety often takes a backseat amidst efforts to provide basic education. Most schools do not have safety audits and/or appraisal systems, nor a system for regular and formal monitoring of safety and injuries in schools.

Thus, implementing school safety programmes is important as:

- Safety is mandated as per rights.
- Schools offer closed environments that are regulated and fall under the ambit of constitutional mandates to enforce safety. With increased enrolment, programmatic interventions in schools approximate all children in the community in terms of reach and coverage, albeit with much lesser resources.
- Students are more receptive in schools than in communities. Hence, school-focused safety interventions help catalyze participation of children in community-based interventions as well.
- School managements bear the responsibility of children's safety.
- Collective inputs can improve safety.
- Demands to improve safety at school increase with the intervention of parents and media.

With increasing pressure from civil society organisations and a greater role of the judiciary, injuries, intentional and/or unintentional are being noticed and the establishment of preventive measures is more relevant than ever today. The current situation indicates an unmet need for comprehensive, objective, self-reliant and reliable safety appraisal systems in schools. These appraisal systems need to be comprehensive, covering existing macro environment determinants such as policies, committees, action plans, budgets, and specific determinants like safety infrastructure, capacity building, transport safety and fire safety in schools.

In this context, a recent review identified the need for developing safety appraisal systems in school environments as part of a larger child injury prevention project in Bengaluru and Kolar. This school safety appraisal report describes the current situation in randomly selected schools in Bengaluru and Kolar.

3. Objectives and methodology

3.1 Objective

This school safety appraisal was designed to examine and understand the current level of safety programmes in a sample of randomly selected schools in Bengaluru and Kolar districts for strengthening measures towards safety of children.

3.2 Preparatory phase

Necessary permissions and support were obtained from the Dept. of Public Instruction, Govt. of Karnataka. An official letter directing the selected schools as well as officials from the Dept. of Public Instruction to participate in the study was issued by the Commissioner, Dept. of Public Instruction (Govt. of Karnataka). Permissions and support were also obtained from DDPI, Bengaluru North, South and Kolar. Bengaluru and Kolar were chosen as regions for the study due to operational reasons as well as to cover urban and rural schools. Informed consent was obtained from all participating schools beforehand and an ethics approval was obtained from the Institutional Ethics Committee at NIMHANS.

About Bengaluru:
Bengaluru is a metropolitan city and the capital of Karnataka. It is known to be an enviable education hub. There are nearly 2,750 private schools in Bengaluru.[7] The highest number of unaided private schools are in Bengaluru South (1,704) followed by Bengaluru North (928).

About Kolar:
Kolar district is located 70 kilometers from Bengaluru and has a population of 1.5 million[3] spread over 6 talukas. Kolar houses the public health observatory of the Centre for Public Health, NIMHANS.

Sampling framework

A list of 990 randomly chosen schools (private unaided, aided, and public schools) from Bengaluru and Kolar was provided by the Dept. of Education (Office of the Sarva Shikshana Abhiyana) as the sampling frame. Out of this frame, we sampled 131 schools by proportionate stratified random sampling technique – 70:30 between Bengaluru and Kolar and 70:30 for Private and Public schools - to account for enrolment levels. The sampling frame was divided into three zones - Bengaluru North, Bengaluru South and Kolar. Subsequently, each stratum was sub-divided into public and private strata. Schools that were unwilling to provide an informed consent or were difficult to locate were excluded and replaced by other nearby schools. The number of schools that were replaced from the original sampling frame were 12 (seven from the North zone and five from the South Zone in Bengaluru).

We also excluded day care centers, schools for the differently-abled and montessoris.

Out of the schools considered in our sampling frame, 46.7% of all private schools are in Bengaluru North and 53.3% are in Bengaluru South. 52% of the public schools sampled are in Bengaluru North and 48% are in Bengaluru South. A similar proportion was maintained while selecting the study sample as well. The ratio was proportionately maintained within each sub-zone.

Table 12: Sampling frame and sampled schools

Type of school based on zones	Sampling frame		Study sample	
	Private	Public	Private	Public
Bengaluru North				
North 1	48	50	7	5
North 2	40	0	6	0
North 3	50	55	8	5
North 4	62	40	9	4
Total - Bengaluru North	200	145	30	14
Bengaluru South				
Anekal	36	52	5	5
South 1	70	64	11	6
South 2	31	0	4	0
South 3	37	0	5	0
South 4	54	17	9	2
Total - Bengaluru South	228	133	34	13
Kolar				
Kolar	86	69	15	7
Mulbagal	NA	55	0	5
KGF	36	0	6	0
Malur	38	0	6	0
Total - Kolar	160	124	27	12
OVERALL TOTAL	588	402	91	39
Total schools completed (n=131)	92		39	

Development of the school safety appraisal tool

The safety appraisal tool was developed by the project team as a means to help collate basic information, with a focus on data necessary to prevent unintentional injuries in schools and immediate surrounding roads. This tool is intended to conduct brief and quick safety appraisals in schools and to understand safety levels in schools, risk of injuries and to explore opportunities for intervention at macro and micro levels. In addition, the tool is intended to enable teachers and/or any trained professionals to monitor improvement in safety levels as well as their own. An e-search of available school safety assessment checklists/schedules/proformas/questionnaires within and outside India was carried out, following which 13 checklists were shortlisted based on the relevance of study objectives. All checklists were reviewed and a review matrix was created.

- Variables commonly present in all checklists were considered relevant from a content validity perspective and were filtered out for inclusion in the tool. Additionally, items were added in keeping with Indian perspectives and directives from the Govts. of Delhi and Karnataka.
- A draft tool was created and subsequently discussed in an expert stakeholder meeting on 27-11-2018. The meeting hosted 23 key stakeholders from schools, the education department, road safety cell, public health bodies, the UL team and NGOs focused on safety. The tool was modified based on the suggestions gathered during the meeting.
- A pilot study was conducted across five schools to understand operational issues during information elicitation. Based on the results, relevant modifications were made and the tool was finalised.

This tool is divided into three parts:
General information, macro-level appraisal and micro-level appraisal. The general information is covered under Section A. The macro-level assessment is covered under Section B. The micro-level assessment is area-specific and is covered from Section C to Section G. The sectionwise details are as follows:

Table 13: Contents of the school safety appraisal tool

Section	Number of items	Domain assessed	Contents	Maximum possible score
A	18	General Information	• School name, type and address • Location of school • Year of establishment and construction • Available facilities • Number of children and faculty	NA
B	19	Macro level safety appraisal	• Safety guidelines/SOP • Safety audits and safety budget • Safety promotion meetings and representatives/ members • Networking with key service providers • Emergency communication systems	25
C	21	Safety appraisal of physical infrastructure	Building structures - walls, windows, balconies, roofs, corridors, entrances and exits Different areas - playgrounds, toilets, classrooms, lifts, laboratories, terraces and water bodies	57
D	18	Road safety and transport safety	• Appraisal of school buses and drivers • Different modes of transport used • Road type and conditions • Road safety signs and infrastructure (zebra crossing, side-walk, traffic signal, pothole free road, etc.)	24
E	5	Fire safety	• Fire safety certificate • Fire fighting systems - fire extinguishers, fire hose, fire sprinklers, etc. • Training and mock drills	10
F	7	First aid for injured	• First aid essentials and services • Networking with nearby hospitals • Maintenance of health records	10
G	5	Child injury statistics	• Number of injuries • Total number of fatalities • Causes of injuries • Absenteeism records	NA
Overall Safety Score - 126				

Development of operation guidelines for data collection

The Operational Guidelines (OG) document - a guide for school safety appraisers was developed to enhance the reliability of data collection. The OG document detailed the process of data collection, section by section, for the benefit of the interviewer. The OG document provided 'operational definition' for variables used in the study, scoring pattern for different variables and 'how to' sections. The appraisers were provided this document during training and were advised to refer to the same during appraisals to ensure quality in data collection.

General scoring pattern

Scoring is applicable for all sections except Section A and Section G, which include the demographic/ general details and child injury statistics respectively. The response codes (number) entered in the answer column is the respective score for each item.

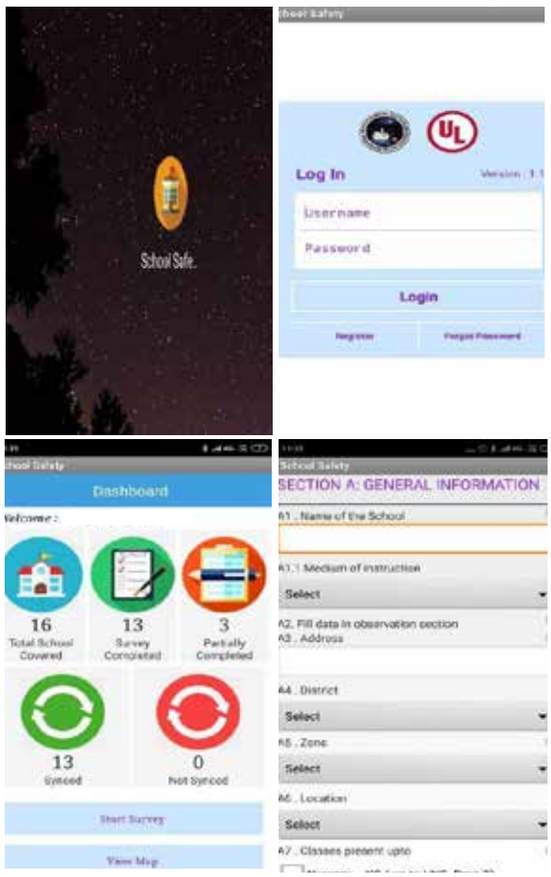
Each item was scored based on the response.
For example, item B1 evaluates the presence of school safety guidelines. If a school has guidelines, it is scored 2. If there are no guidelines, the school is scored 0. The higher the score, the better the situation.

The score for each item in all the sections is added to arrive at the sub-total score for that section. The sum of all sub-total scores from all sections forms the total score for that school. The maximum possible score for each school is 126. The total possible score for each school may vary on the number of items which have been included for appraisal and responded to by teachers depending on applicability of items.

Development of mobile application

- The finalised tool was digitised into an android mobile application
- The test run of the application was deployed in 5 schools to understand the challenges in data collection. The challenges faced were: flow of data dashboard from section to section, multiple response entries and scoring and were rectified before proceeding further.
- All technical glitches observed during the appraisal process were addressed and the modified application was provided to all field information officers.
- The mobile application enabled accurate capture of the location, date and time of appraisal.
- The application generated sectionwise scores as well as the total score for each school.
- Project investigators were able to monitor the progress of data collection through a different user access control system. The application enabled uniform data collection, limited errors and allowed for regular monitoring and customised automated scoring of safety levels in each school.

Screenshots: Mobile application to conduct school safety appraisal



Training for appraisers

A training programme was conducted for 8 appraisers in the second week of January, 2019. The programme included classroom sessions, hands-on training sessions for the mobile app and data collection exercises in two schools. The training was provided by the IT developer and project investigators. The OG document was provided as a reinforcement for the training modules.

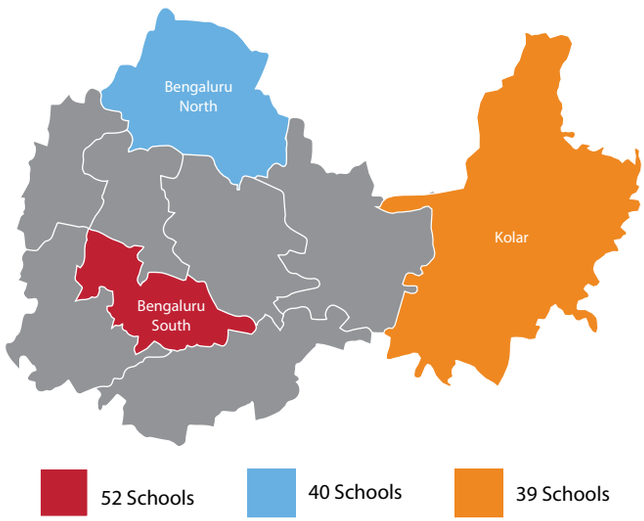



Data collection

A phased data collection plan was developed for the study considering the geography, travel, approval, permissions and other logistics. The process of data collection was initiated on 2nd January, 2019 and was completed by 15th March, 2019. The appraisal process was conducted in three phases;

- Interviews to obtain general information, macro areas and other safety related sections.
- Review of records maintained by the school management (safety guidelines, SOP for emergency communication, fire safety certificates, certificate for safe lifts, record of injuries, medical records, files of children, etc.)
- Onsite observation of school surroundings (observational survey of classrooms, corridors, etc.)

Figure 24: Distribution of schools studied



Data management

All data collected through the mobile app was synced to a central server. The data collected was monitored by the project team on a weekly basis. The team also monitored the data collection process on a daily basis and coordinated the survey process - allotment of schools, obtaining permissions, facilitating queries raised by data collectors, negotiations with school management, etc.

Table 14: Sectionwise scoring in school safety appraisal tool

Section	Assessment area	Number of items (scored)	Maximum possible
A	General information	18	0
B	Macro level safety	19	25
C	Physical infrastructure	21	57
D	Road safety	18	24
E	Fire safety	5	10
F	First aid	7	10
G	Injury records	5	0
	Overall safety score		126

Statistical analysis

The distribution of schools and socio-demographic information were presented as frequencies and percentages.

School safety score

Every school was scored based on responses to items in each section of the tool. Scores obtained for each section were summed finally for all sections to get a total score for the school. The maximum possible score for the highest performing school was 126. Scores obtained by each school were summarised by mean and standard deviation.

Safety level (%) in each school

After getting a total score for each school, the final score was divided by the maximum possible score (126) and multiplied by 100 to get the safety level (%) of each school.

Safety level (%)=(Score obtained by each school/maximum possible score)*100

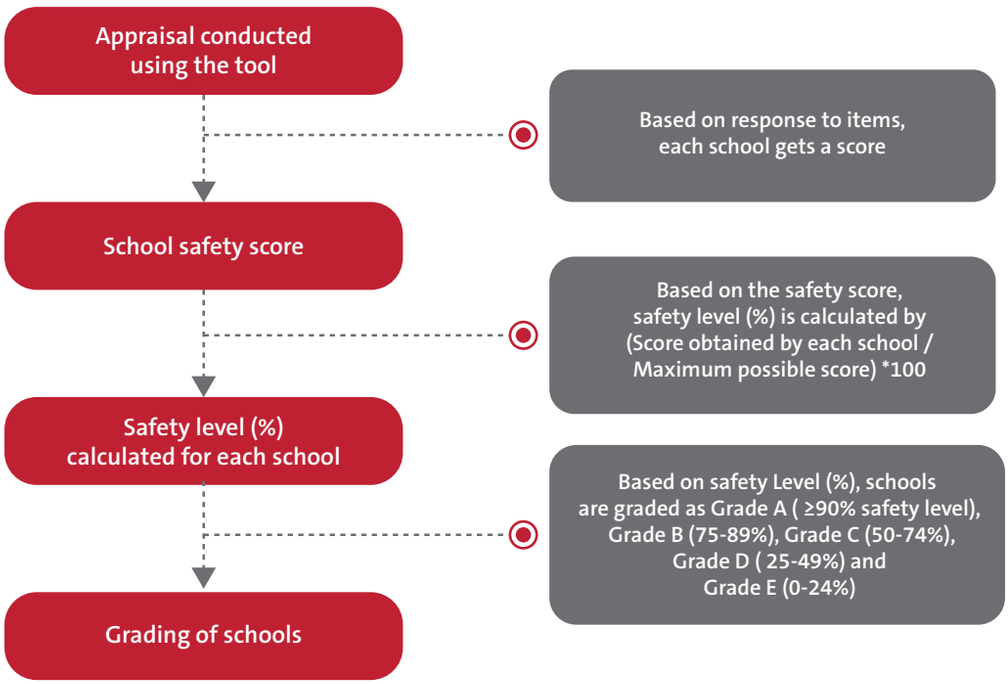
For example: If a school received an overall safety score of 80, the safety level (%) is calculated as 80/126 x 100=62.99%. Based on the safety level (%) identified, schools were categorised as Grade A, Grade B, Grade C, Grade D and Grade E schools, with Grade A schools having the highest levels of safety and Grade E schools having the lowest levels of safety (Table 15).

Table 15: Safety level (%) and grading of schools

Safety level (%)	Grade	Inference based on safety level (%)
≥90%	Grade A	Safety levels are between ≥90% of maximum possible score
75- 89%	Grade B	Safety levels are between 75-89% of maximum possible score
50-74%	Grade C	Safety levels are between 50-74% of maximum possible score
25-49%	Grade D	Safety levels are between 25-49% of maximum possible score
<25%	Grade E	Safety levels are less than 25% of maximum possible score

The purpose of scoring and grading is to convert the safety environment in each school into quantifiable and measurable criteria. This data can then be used by individual schools to measure their safety level at periodical intervals as well as to monitor progress/change in safety levels over time. The objective is to achieve a maximum possible score and safety level i.e. Grade A over a predefined period. However, it is important to note that the grades can be a starting point in determining the current safety levels in a particular school based on appraisals conducted and not the result derived through safety audits.

Figure 25: Quantification and grading of safety in each school



Indicators for monitoring school safety

Scoring and grading is useful at an individual school level to assess the institution's safety performance. However, at the district, state or departmental level, information on the overall performance is required to strengthen safety policies and programmes. This can be achieved with data on select indicators that are uniform, sensitive and reliable. Hence, a set of indicators for monitoring safety at the district level, which can also be used at the state level with expansion of activities was developed. Accordingly, a set of indicators were developed and are presented (listed below) (Annexure Table 10). With progress in school safety activities, these indicators can be revised to focus on both general and specific areas of enquiry.

Indicators

1. Percent of schools scoring Safety Grade A and above
2. Percent of schools implementing SOPs and guidelines (can be provided by state or developed within the school) for safety
3. Percent of schools with one or more dedicated and exclusive staff to manage safety activities
4. Percent of schools with formally trained teachers or staff in safety and injury prevention
5. Percent of schools with fire safety certificate
6. Percent schools with specific road safety programmes

Road safety programme covers all the below

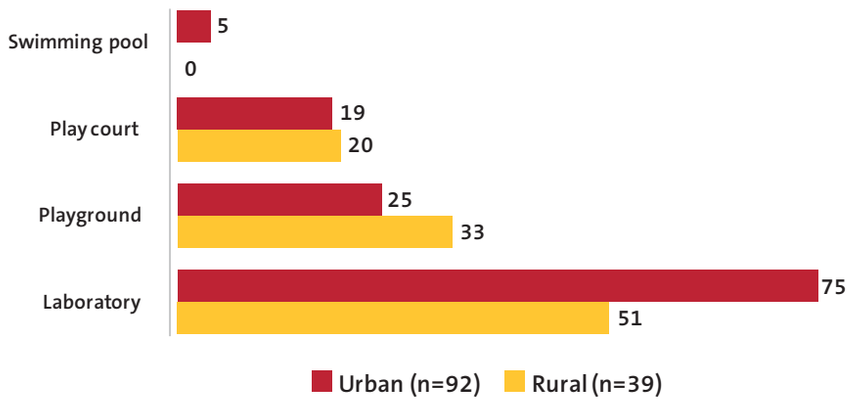
- Conduct road safety education programmes for children
- Signages around schools (school zone, speed signage, dropoff/pickup zone) are present in all surrounding roads
- Presence of pedestrian crossing /zebra crossing facility in all surrounding roads
- Presence of speed bumps on all roads leading to school
- Support for road crossing for young children
- Presence of safe school buses as per all criteria laid down by govt./supreme court (Color, labeling, trained drivers, GPS, speed breakers, lady care assistant)

4. Results

4.1 Disposition of schools

A school environment comprises of macro and micro areas, both within and outside a school building. Depending on the nature of schools, these vary with classrooms, laboratories, libraries, playgrounds, etc. Each of these could be injury precipitating/ producing areas, depending on the implementation of school safety practices. Availability of labs, playgrounds and the type of road in which the school is located are factors that determine injury risks among school students. These factors are also relevant while estimating the need for safe supervision.

Figure 26: Proportion of schools facilities - urban and rural (%)



Based on our observations, nearly 68% of the 131 schools had laboratories implying a need for strengthening fire and chemical safety measures. Playgrounds, play courts and swimming pool facilities were present in less than one fourth of the schools. The concentration of playgrounds in rural schools was higher owing to ease of access/affordability as against urban schools. However, more public schools in urban areas (29%) had playgrounds compared to private schools (23%). Most schools in rural areas (74%) and urban areas (62%) were located on inner roads, which are in residential areas and have lesser traffic (Figure 26).
In rural areas, public schools (28.6%) were more in main roads than private schools (24%). The schools located off the main roads were found to be concentrated more in the urban areas (36%) compared to the rural areas (26%).

4.2 Macro level areas for school safety

Macro environment determinants for safe schools comprise operational and functional directives that determine organization, implementation and monitoring of safety levels in schools. These refer to the presence of safety policies, safety committees, guidelines and SOPs, funding, training of staff, availability of trained safety personnel and communication systems with parents and stakeholders. Macro-level determinants are managerial in nature, are guided at the national and state levels through directives and are implemented at individual school levels. Our appraisal focussed on the following five areas to examine the macro components of a system and processes to guide safety activities:

- School safety guidelines and SOPs for emergency communication
- Funding allocation for safety maintenance and school safety audits
- School safety committee and staff responsibilities
- Safety education and training
- Connectivity with parents and networking with public services

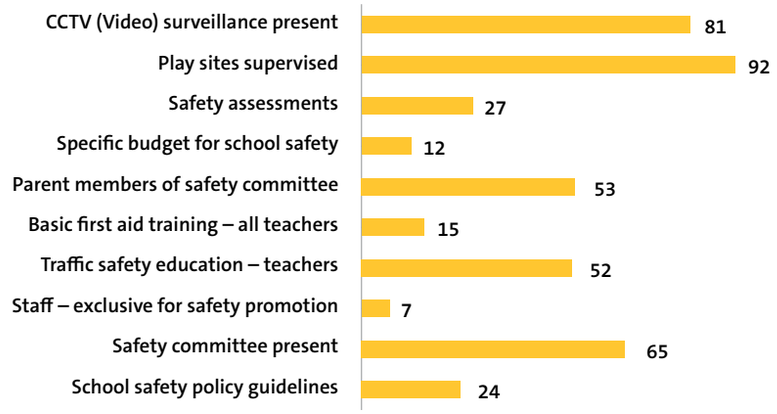
4.2.1 School safety policies, guidelines and SOPs

At a national level, the National Disaster Management Authority (NDMA) released the School Safety Policy and Guidelines in the year 2016. In February 2017, the Ministry of Human Resource Development, the Department of School Education and Literacy and the Government of India directed all the states to implement the NDMA National School Safety Policy Guidelines[95]. Yet, most states in India do not have state-specific school safety policies, guidelines or SOPs. Ideally, policy guidelines and SOPs need to be deployed in every school. In addition, these guidelines need to be in-line with the state or a national level policy as they catalyze safety intervention within each school.

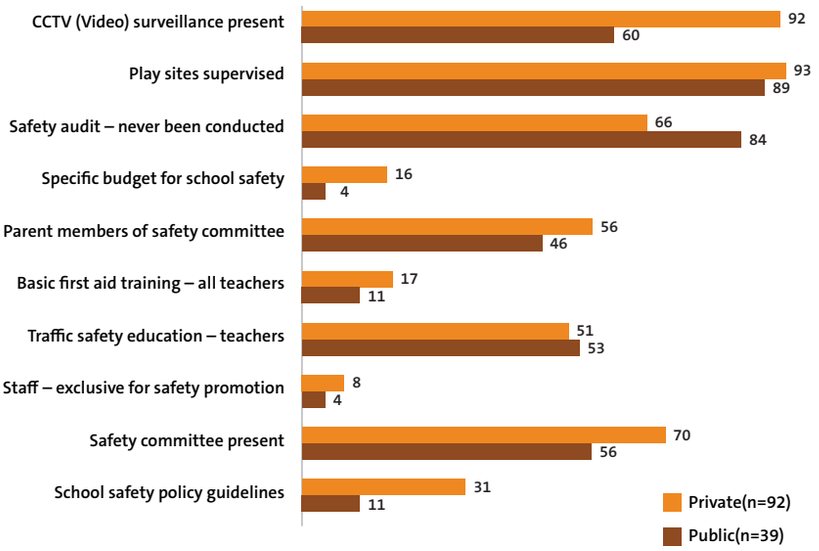
The appraisal revealed that 24% of all schools, 38% of rural schools and 31% of all private schools have school safety guidelines. In rural areas, 48% of all private schools reported the presence of school safety guidelines. Responses provided by the public schools may be viewed in light of ignorance of the national school safety guidelines, which is applicable to all public schools. The SOP for emergency communication was reported in 74 schools (56.5%). Nearly 71% of public schools in rural areas had SOPs for communication as against 32% of public schools in urban areas (Figure 27 - A, B, C).

Figure 27: Macro perspectives of school safety (%)

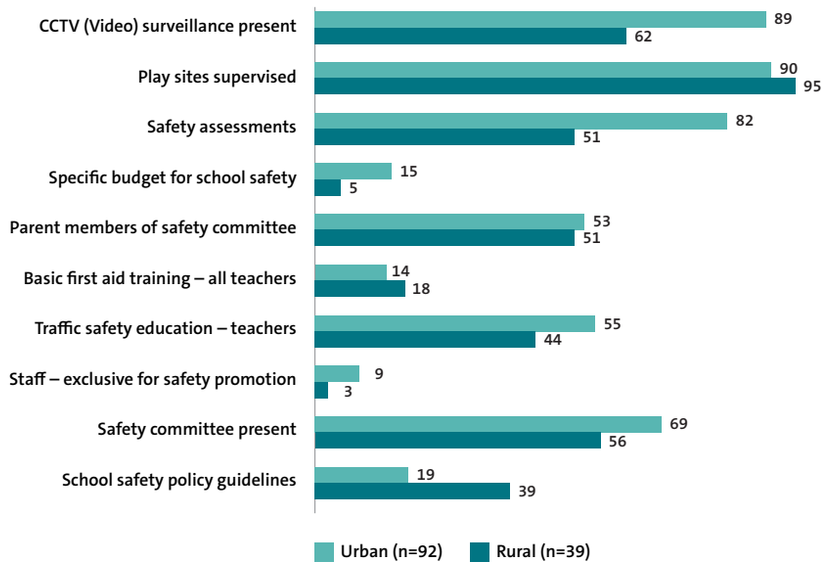
A. Macro environment for school safety (n=131) (%)



B. Macro environment for school safety - Public v/s Private (%)



C. Macro environment for school safety – Urban v/s Rural (%)



4.2.2 Funding for school safety and safety audits

Safety funding for schools is derived from investment allocations made by the government and the school, contributions from parents and funding from philanthropic agencies. 'Safety budget' refers to the funds exclusively allocated for safety promotion in the beginning of the financial/calendar year. A defined and dedicated safety budget was not present in 88% of schools. It was observed that dedicated budgets for safety were reported only in 12% of the schools, more so in private schools (16%) and schools concentrated in urban areas. Private schools in urban areas (21%) had a provision for a safety budget as against 4% of private schools in rural areas. Nearly 7% of public schools in rural areas reported having a budget for school safety.

Safety assessment is an in-depth evaluation of risk levels for safety programs and practices within an institution/organization. It is conducted by domain experts and is not the same as the inspection conducted by the government officials. In 73% of the schools, safety assessments had never been conducted before, and in 10% of the schools, the assessment was conducted twice during the previous year. The number and frequency of assessments were more in public schools in rural areas (36%) as against schools in urban areas. (Figure 27 - A, B, C)

4.2.3 School safety committees

A school safety committee refers to more than two people appointed/designated officially by the school management to oversee/coordinate/implement safety measures within the school. The job of the committee is to oversee, guide and implement safety activities at the school level. As per our study, school safety committees were present in 65% of the schools. Nearly 42% of public schools in rural areas and 61% in urban areas had school safety committees. Also, more than 64% of private schools had school safety committees. (Figure 27 - A, B, C)

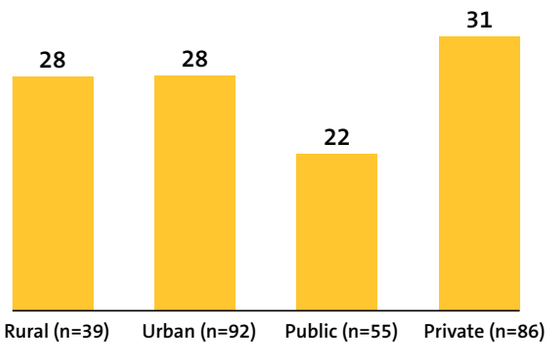
Around 7% of the schools reported appointing a staff member exclusively for safety promotion. Most of these schools were located in private urban schools. But close to 58% of the schools had designated staff members for safety promotion. Observations indicated a need for training designated staff members in the schools. In addition, the study also implied that schools were more in favour of incumbent staff members rather than hiring a new person, due to economic reasons. On the downside, 35% of the schools reported absence of staff for safety activities in school. This was reported more in public schools located in rural areas (79%). In 77% of the schools, common areas such as washrooms, corridors, staircases, etc. were monitored at all times by a staff member in charge.

4.2.4 Safety education and training

Safety education refers to the education on how to be safe during different emergency situations or precautions to be taken in different places like roads, playgrounds, laboratories, water pools, buses, etc. Safety education was covered as part of the school curriculum in nearly 28% of the schools.

Nearly one-third of all private schools in rural areas had safety education in the school curriculum as against 29% of schools in urban areas. (Figure 28)

Figure 28: Safety education in school curriculum (%)



Traffic safety education for teachers and students was usually handled by the traffic police department or non-government organisations (NGO), implying limited in-house capacity to deliver traffic safety education. In nearly 52% of schools, the students were exposed to some sort of traffic safety education. It was also observed that 43% of public schools in rural areas and 71% of public schools in urban areas had implemented traffic safety education for students (contents and duration varied). Also, 52% of the schools had conducted traffic safety education for teachers. In 66% of the schools, at least a few teachers were trained in basic first aid, with a majority of these schools being public schools (84%) in urban areas. In rural areas, 21% of public schools had all the teachers trained in basic first aid as compared to private schools (16%).

4.2.5 School to parent connect

In 52.7% of the schools, the school safety committee formed by the schools have parents as members of the committee. Only 5% of the schools reported they are not connected with parents through an SMS messaging system, either full-time or during emergencies. Networking/ Memorandum of Understanding (MoU) refers to a written agreement between the school and other key service providers such as hospitals, police stations, fire stations and the Municipal Corporation, in order to ensure compliance and permission to associate with and provide required service, to the schools. Almost 80% of schools did not have any sort of written MoU with public services. MoU was found to be comparatively more in private schools (23.3%) than public schools (13.3%). MoU was present comparatively more in schools in rural areas (25.6%) than schools in urban areas (17.4%). Almost 78% of schools did not have tie ups with hospitals around a 5km radius of the school campus.

As mentioned before in section B3, the school safety committee is formed by more than two members. At least one member of the committee should be a parent whose child is enrolled in the school. Out of 85 schools that had a safety committee, 81% of schools had a parent as one of the members in the committee. Safety committees with parents were observed more in rural areas, whereas it was 100% in public schools and 87% in private schools. Almost 53% of the schools communicated with parents through a messaging system on a regular basis. This was observed more in private schools (80%) in urban areas. It was observed that none of the private schools in rural areas were connected with parents through a messaging system. Nearly 20% of the schools have a MoU with key service providers and it was observed more in private (28%) and public schools (21%).

Nearly 36% of public schools and 32% of private schools in rural areas had tie ups with hospitals as against schools in urban areas where only 16% to 18% of the schools had tie ups with hospital within a 5km radius.

4.2.6 Digital safety surveillance

By orders, CCTV surveillance was made mandatory in all the schools for security reasons.

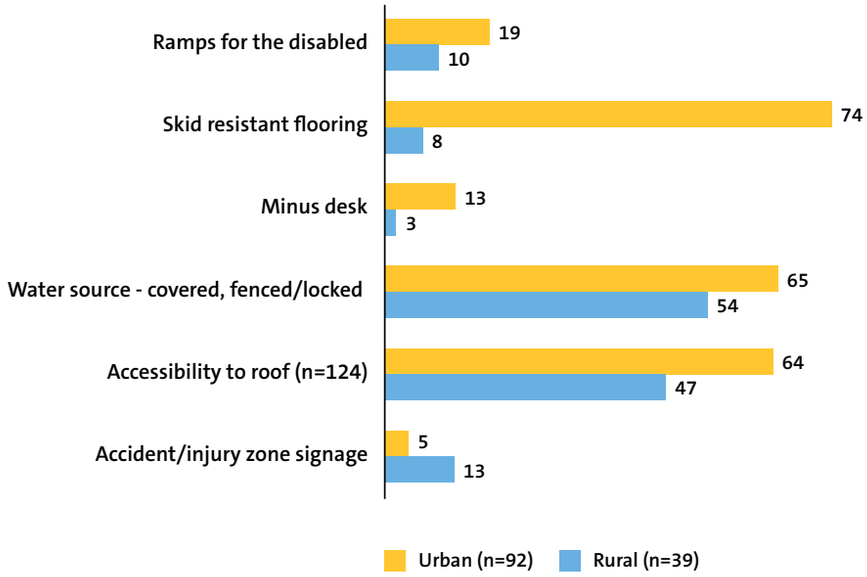
As a result, nearly 81% of all schools had installed CCTV cameras. Among 106 schools, with CCTV surveillance, it was observed that 82% of the schools monitored the recordings and stored them for at least a month. In 70% of the schools, CCTV surveillance was present within and outside the school premises. This was observed in 75% of public schools and 89% of private schools in rural areas.

4.3 Physical infrastructure and safety

Physical infrastructure in every school was assessed by a combination of interviews and observation methods.

An observational survey was conducted to assess the damages to window panes, grills, electrical points and sockets; adequacy of lighting in classrooms and corridors; safety of ramps and balconies; and safety certificates for lifts.

Figure 29: Physical infrastructure and safety in schools (%)



- Accident/injury zone signages within the school premises were observed in 16% of private schools located in rural areas. Nearly 60% of all schools afforded easy access to the terrace, posing higher risk of falls and/or intentional injuries. Over 76.7% of public schools in urban areas afforded easy access to the terrace.
- Unprotected/uncovered water sources can pose a risk of drowning. In nearly 62% of schools, water sources were covered and fenced/locked and not accessible to children. In 50% of public schools in rural areas, the water sources were covered but not locked, consequently posing a risk of drowning.
- Although widely recommended as a preventive measure to avoid posture-related injuries, minus desks were used in only 10% of the schools.
- 54.2% of the schools had skid-resistant flooring. Nearly 92.3% of schools in rural areas and 26.1% of schools in urban areas did not have skid-resistant flooring.
- Number of schools with more than 75% of elements (windows, sockets, balconies, corridors, lighting, etc.) which were safe was examined in the study. The appraisal revealed that in 85% of the schools, >75% of all windows were examined to be safe.
- Similarly, 75% of all electrical sockets (92%) and balconies (88%) in surveyed schools were safer in schools located in urban areas than schools in rural areas. However, corridors and windows were found to be safer in schools located in rural areas.

Table 16: Safe windows, electrical sockets, balconies and corridors in schools

	Schools where >75% of assessed were safe		
	Rural (n=24)	**Urban (n=107)**	**Total**
Windows	21 (87.5%)	90 (84.1%)	111 (84.7%)
Electrical sockets	21 (87.5%)	98 (91.6%)	119 (90.8%)
Balconies	21 (87.5%)	94 (87.9%)	115 (87.8%)
Corridors	21 (87.5%)	88 (82.2%)	109 (83.2%)
Lighting in classrooms	23 (95.8%)	103 (96.3)	126 (96.2)

4.4 Chemical safety

- Laboratories were not present in 23% of the schools surveyed. Among 89 schools which had laboratories, a working exhaust fan was present only in 25% of the schools. In rural areas, half of the public schools had exhaust fans in laboratories and in urban areas, 34% of private schools had exhaust fans in laboratories.
- Almost 60% of all school laboratories had chemicals labelled properly. Also, these chemicals were stored away from children's reach. In a majority (83%) of public schools in rural areas, chemicals were labelled and kept away from children as against the public schools (36%) in urban areas.

4.5 Fire safety

- Fire safety is a mandatory safety compliance component in schools as per the child safety manual[10]. Hence, precautionary measures for all sorts of fire emergencies are to be undertaken in the schools.
- The appraisal revealed that a cooking unit was present only in 18% of the schools. The cooking unit was present more in public schools in rural areas (86%) as compared to public schools (7%) in urban areas.

- The fire safety certificate, which is periodically validated by the concerned authority, was found in 33% of all the schools. 39% of public schools and 46% of private schools in urban areas had a fire safety certificate.
- The do's and don'ts in case of a fire emergency were found to be displayed more (44%) in private schools located in rural areas.
- Over 40-64% of fire safety mock drills were conducted in schools located in rural areas.
- Fire safety mock drills were conducted more in schools (40% to 64%) located in rural areas as against schools in urban areas (19% to 39%).
- Emergency exits were present only in 22% of the schools and in 40% of private schools located in rural areas.
- Evacuation plans, fire log books, fire detectors and fire alarms were present in less than 8% of the schools.
- Fire extinguishers were found in a majority (94%) of the schools. Schools in rural areas had more fire extinguishers compared to schools in urban areas. While all the public schools surveyed had fire extinguishers, 96% of private schools surveyed reported fire safety equipment.

Table 17: Assessment of fire safety aspects in schools across locality and type

	Rural (n=39)		Urban(n=92)		Total
	Public (%) N=14	Private (%) N=25	Public (%) N=31	Private (%) N=61	131
Cooking unit present	12 (85.7)	0 (0)	2 (7.4)	2 (5.7)	16 (17.6)
Fire safety certificate	0 (0.0)	3 (12.0)	12 (38.7)	28 (45.9)	43 (32.8)
Dos and don'ts displayed	2 (14.3)	11 (44.0)	8 (25.8)	10 (16.4)	31 (23.7)
Fire-mock drill					
Never been conducted	4 (28.6)	12 (48.0)	19 (61.3)	31 (50.8)	66 (50.4)
Once a year	9 (64.3)	10 (40.0)	6 (19.4)	24 (39.3)	49 (37.4)
More than once a year	1 (7.1)	3 (12.0)	6 (19.4)	6 (9.8)	16 (12.2)
Emergency exit	3 (21.4)	10 (40.0)	2 (6.5)	14 (23.0)	29 (22.1)
Evacuation plan	0 (0.0)	0 (0.0)	1 (3.2)	2 (3.3)	3 (2.3)
Fire log book	0 (0.0)	0 (0.0)	1 (3.2)	6 (9.8)	7 (5.3)
Fire alarm	0 (0.0)	0 (0.0)	1 (3.2)	9 (14.8)	10 (7.6)
Fire extinguisher	14 (100.0)	24 (96.0)	28 (90.3)	57 (93.4)	123 (93.9)

4.6 Transport safety

One third of a billion children travel to school every day in India. A strong association between road injuries among children, their mode of travel and the distance to school is reported. Children who cycled to school were more likely to be injured compared to children who walked (OR 1.5; 95% CI 1.2 to 2.0). Travel by school bus was safer than walking (OR 0.5; 95% CI 0.3 to 0.9)[98].

Travel patterns observed as part of the appraisal were:
- Travel by school buses, private vans and autos
- Travel by government operated buses
- Parents dropping their children on a two wheeler/four wheeler
- Travel by cycle or walking

Table 18: Assessment of transport safety in the schools.

Requirements for school bus	Rural (n=39)		Urban(n=92)		Total
	Public (%) N=14	Private (%) N=25	Public (%) N=31	Private (%) N=61	131
School bus present	5 (35.7)	17 (68.0)	4 (12.9)	27 (44.3)	**53 (40.5)**
Fitness certificate for school buses (n=53)	3 (60.0)	15 (88.2)	4 (100.0)	24 (88.9)	**46 (86.8)**
GPS trackers in school bus (n=53)	0 (0.0)	3 (17.6)	3 (75.0)	25 (92.6)	**31 (58.5)**
CCTV in school bus (n=53)	1 (20.0)	3 (17.6)	1 (25.0)	18 (66.7)	**23 (43.4)**
Police verification of drivers (n=53)	5 (100.0)	17 (100.0)	4 (100.0)	20 (74.1)	**46 (86.8)**
Drivers checked for drugs and alcohol intake (n=53)	3 (60.0)	10 (58.8)	3 (75.0)	23 (85.2)	**39 (73.6)**
Pickup and drop off zones present in school	4 (28.6)	4 (16.0)	5 (16.1)	29 (47.5)	**42 (32.1)**
Transport safety manager	2 (14.3)	11 (44.0)	9 (29.0)	30 (49.2)	**52 (39.7)**

The study also included:

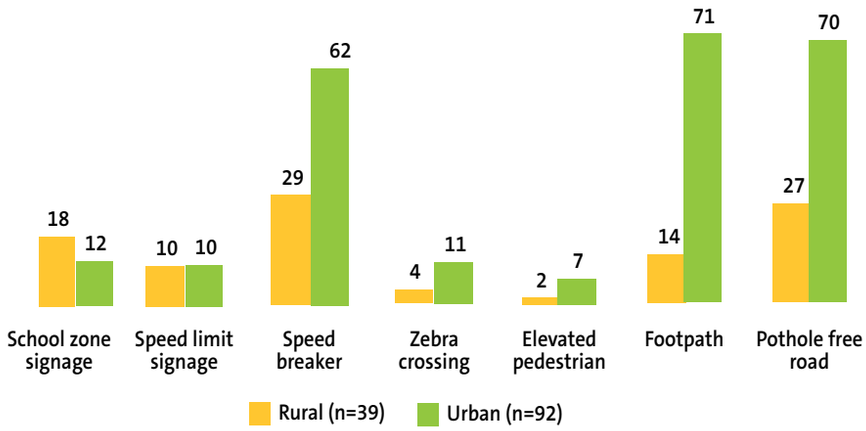
- Road safety education programmes for children;
- Signages around the schools (school zone, speed limit, dropoff/pickup zone);
- Presence of pedestrian crossing/zebra crossing in all surrounding roads;
- Road crossing assistance for young children;
- Safety parameters followed for school buses as ordered by the government/supreme court (color, labeling, trained drivers, GPS, speed breakers, assistance for girls, etc.).

As per our appraisal :

- 40% of schools had bus facilities for safer transportation of children. 44% of private urban schools and 68% of private schools in rural areas too had bus transport facilities. Out of 53 schools operating school buses, 87% of them had valid fitness certificates.
- GPS trackers were found to be more in buses of schools in urban areas compared to schools in rural areas.
- CCTVs were found to be more in school buses operating in urban areas and in private school buses (67%). In 87% of the schools surveyed, drivers had to go through police verification before being hired.
- 74% of private schools in urban areas had hired drivers with prior police verification. The drivers were often checked for consumption of drugs/alcohol in 74% of the schools surveyed.
- A transport safety manager was found to be present in 40% of the schools. The numbers were more in private schools (44%-49%) as compared to public schools (14%-29%). The overall safety with regard to road transport and school buses was better in private schools in the urban areas.
- A designated pickup and drop off zone was present in only 32% of the schools. This was observed more in the private schools (47%) in the urban areas.
- Children also reach school using other modes of travel and hence, the safety of roads adjoining the school is equally important. We assessed 173 roads adjoining the 131 schools surveyed, only 56% of the roads were free of potholes, 52% had speed breakers and 49% had footpaths.
- School zone signage (17.3%), speed limit signage (11.5%) and zebra crossing (5.2%) are areas that need improvement in adjoining roads surveyed.

Out of the 131 schools, roads adjoining 18 schools had a speed limit sign and 70 schools had roads with speed breakers. Zebra crossing was present in less than 10% of the roads despite 32.8% of the schools located on busy roads. Signages for school zones were found in only 21% of the schools.

Figure 30: Safety in roads adjoining the schools (n=173 roads)



4.7 Emergency first aid

Table 19: Assessment of first aid essentials and other medical/health records in schools

	Rural (n=39)		Urban (n=92)		Total
	Public (%) N=14	Private (%) N=25	Public (%) N=31	Private (%) N=61	131
First aid service in school	11 (78.6)	23 (92.0)	29 (93.5)	58 (95.1)	**121 (92.4)**
Health card for students	13 (92.9)	15 (60.0)	19 (61.3)	36 (59.0)	**83 (63.4)**
Record of injuries – absent	13 (92.9)	25 (100.0)	28 (90.3)	52 (85.2)	**118 (90.1)**
Display of ambulance numbers	5 (35.7)	12 (48.0)	3 (9.7)	13 (21.3)	**33 (25.2)**
Unexpired stock in first aid box	2 (14.3)	8 (32.0)	17 (54.8)	39 (63.9)	**66 (50.4)**

- Most schools (92.4%) reported providing first-aid services in school, more in the private and the urban schools. In almost half the schools, the first aid box had unexpired stocks of first aid essentials.
- The health cards for the students were present in 63.4% of schools and they relate more to the annual medical appraisal of children. There were no specific injury recording system in these schools.
- Health records are present more in public schools (71.1%) than in the private schools(59.3%) due to rules in the Department of Education to maintain health cards of each child. The health cards were found to be high in the schools of rural areas (71.8%) as compared to the schools of urban localities (59.8%).
- Majority of the schools (90%) didn't have any sort of injury-related records. The injury-related records were present and regularly updated in only 3% of the schools which are urban private schools. Though in 6.9% of the schools that the injury-related records were present, but were not maintained regularly.

4.8 Safety levels and grading of schools

Safety appraisals were quantified into safety level percentages and grading for each school (Refer Figure 25).

Quantification and grading of safety in each school

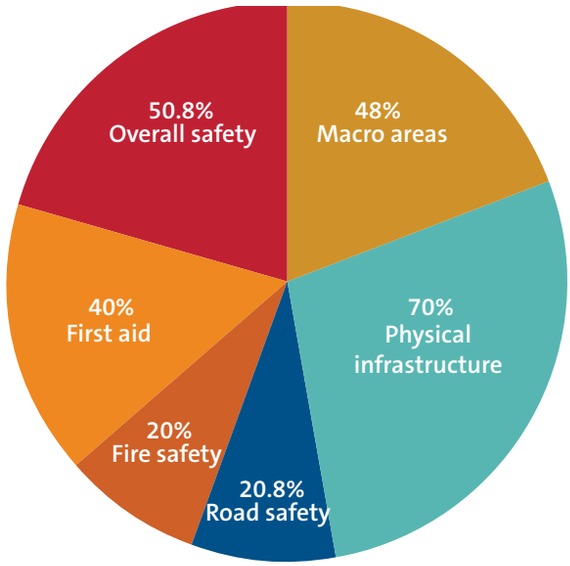
School safety score is the score obtained by each school based on responses to the appraisal tool. The maximum possible score that each school can receive was 126. Safety levels for each school were calculated using this number.

Safety level percentage=(score obtained by each school/maximum possible score)*100

The safety level percentage is a crude indication of the safety level in that particular school at the time of appraisal. It implies that at the time of survey, the schools were functioning at a certain percentage of safety level. It also provides a baseline value for the purpose of future progress monitoring. All schools were graded based on safety percentage.

The appraisal revealed that the overall safety level in all schools was 50.8% (Figure 31). The safety level was better in private schools (54.4%) and urban schools (50.8%) (Figure 32 - A and B). The safety level with regard to macro areas was 48%. This indicates a need to strengthen policies, safety committees, safety guidelines, training methods and budgeting aspects of school safety in public and private schools alike.

Figure 31: Average safety level (%) of schools



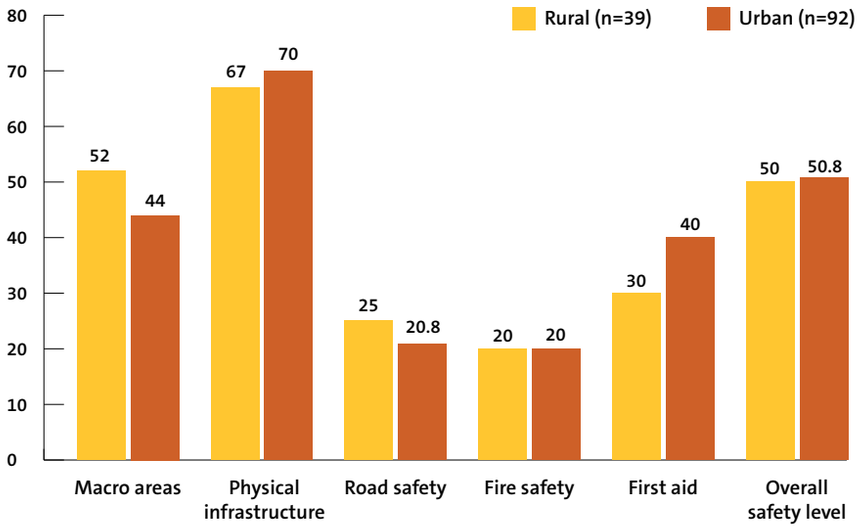
Road safety levels were found to be at 20.8% (16%-33% across different schools), implying an urgent need to implement road safety practices in roads adjoining schools.

The fire safety level across all schools was found to be around 20%, indicating poor implementation of fire safety guidelines.

Systems to provide first aid care for injured children was at 40%, highlighting need for further improvement.

Figure 32: Safety levels (%) in schools

A. Safety level (%) in schools - Urban v/s Rural



Based on our appraisal, only one school was graded A and referred to a private school located in urban area. Most schools were graded as C (48%) and D (48%) respectively. It implies most schools had safety levels (%) between 25-74%. Although the distribution of Grade C and D was similar, misdistributions existed between public and private schools.

Among public schools, nearly 22% were graded C as against 62% of private schools. The difference in distribution between grade C and D was more between public and private schools than between schools in rural areas and urban areas. Considering this as a superficial and rapid appraisal, the low grading is an eye opener regarding the level of safety in our schools. The appraisal provided a baseline grading for assessing progress in future.

Information systems for injuries in schools are virtually absent as most schools did not have a system for recording or reporting injuries. This limits evidence-based planning of child injury prevention strategies at the school, district or national level. The study concludes that safety levels in schools meet only half of the expectations and there is a need to improve school safety in all assessment areas. Nevertheless, it is encouraging that our assessment provided a baseline to monitor progress in interventions in future.

B. Safety level (%) in schools - Private v/s Public

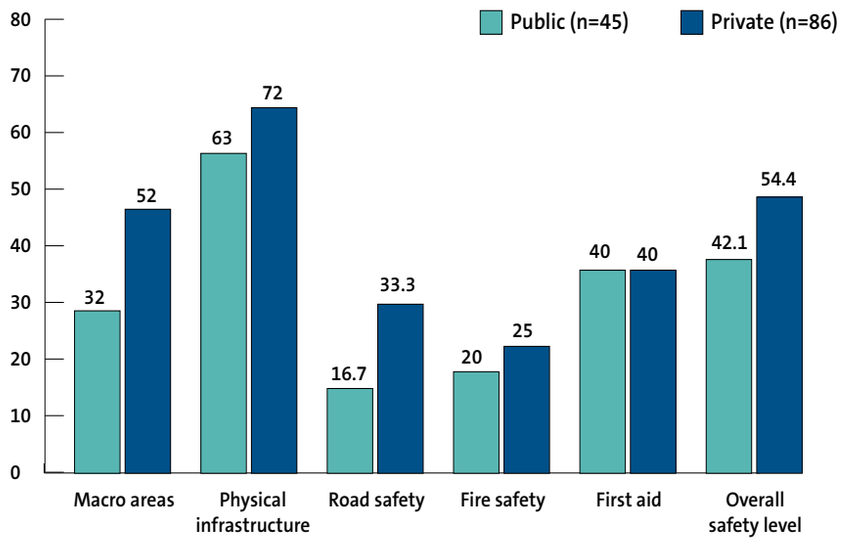
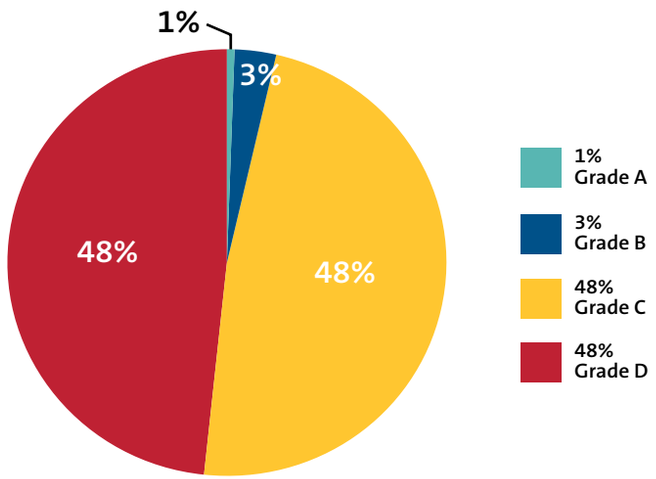


Figure 33: Grading of schools based on safety level (%) (n=131)



5. Limitations and challenges

We had approached a limited number of schools (sample size is convenient) but the selection of these schools was random. Hence, the size may have limited statistical power to conduct analytical statistics. Facilitating appointment and participation of schools was a big challenge as managements were busy in exam preparations. In the appraisal tool, some of the items could have been missed even though it was an issue of concern. The mobile application was useful but paper and pencil formats were still used for conducting walkthrough surveys as it was more practical. As it was a first step, we provided equal weightage/score to all components of safety assessment instead of adopting a differential and proportional system of scoring. This was done intentionally as the objective was to develop a simple scoring system for the self-monitoring of safety levels that could be done at the school level by the school staff themselves.

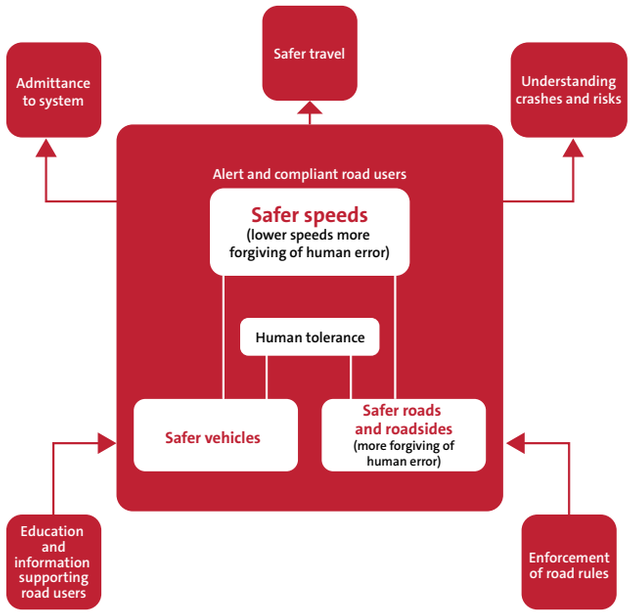
Section 3: Public health and systems approach to child safety

"The future of a country is its young people. We cannot afford to lose our children to road traffic crashes."
- Dr Margaret Chan, Former Director - General, World Health Organization

As outlined in the previous sections of this report, child injuries are a major public health problem. Injuries in general and child injuries in particular, are complex events occurring due to an interaction between children, products they use, the environment in which it happens within the larger context of its governing systems. They can occur at home, on the road, in schools and educational institutions and in recreational and play sites. Understanding the extent of the problem, determinants and current strategies/approaches/ ongoing initiatives will help identify 'where we are?' and 'where do we want to go?'.

The objectives of child safety injury-prevention safety-promotion are to ensure healthy growth, development, safety and survival of children - today and tomorrow. The goals of injury prevention and care are to ensure that children are protected and safe at all times. In the event of occurrence of an injury, all efforts should be made to ensure that the child receives a high quality of medical/surgical/ rehabilitative care, so that deaths and disabilities are reduced significantly.

Figure 34: Safe systems approach



Source: World Health Organization. Powered two and three wheeler safety: A road manual for decision makers and practitioners. Geneva ; 2017.340p

Globally, injury prevention and safety approaches have been developed over a period of time, beginning with the classical epidemiological approaches to the recent safe systems approach. The development and evolution of these approaches are broadly based on the Haddon's matrix developed in the 1970's, based on the understanding that mechanisms of injury and energy transfer are important. With scientific understanding, it has been possible to delineate several factors that occur before, during and after an injury from a child, product and environmental perspective.

The recent safe systems approach recognizes that people (including children and even adults) make mistakes due to inherent physical, physiological, psychological, social and environmental reasons and these mistakes should not lead to an injury. As children are more vulnerable to injury, the damage should be limited/restricted in a way that children are protected and made safe. The safe systems approach also envisages the continuous engagement of all sectors towards a common goal. The larger focus of the safe systems approach is to see that the environment - traffic environment in particular - is safe for the child.

Safe systems approach is primarily adapted in road safety, but the principles are equally applicable to prevention and control of other injuries.

Principles of safe systems approach

- People make mistakes that can lead to road crashes.
- The human body has a limited physical ability to tolerate crash forces before harm occurs.
- A shared responsibility exists amongst those who design, build, maintain and use roads and vehicles and provide post-crash care to prevent crashes resulting in serious injury or death.
- All parts of the system must be strengthened to multiply their effects and if one part fails, road users are still protected.

1. Child injuries are predictable and preventable

The recognition of the concept of energy production transfer and its subsequent damage resulted in the development of national policies, programmes, standards, regulations, and legislations to create safer products and environments.

This resulted in a significant reduction of child deaths, injuries and disabilities. Factors such as the highest level of political commitment, regulation/ legislation, policies and programmes, institutional approaches, greater level of implementation through enforcement of standards/regulations/ legislations at homes - in traffic environment and in recreational sites, greater funding, capacity strengthening, integrated and coordinated approaches as well as monitoring and evalution played a significant role towards this change.

Number of programmes/activities/interventions based on education, engineering, enforcement and trauma care were strengthened to make the environment and the products safer for children to use.

Several evidence-based examples from High Income Countries and have demonstrated the feasibility and possibility of reducing child injury deaths, hospitalizations and disabilities (Box 1). In essence, these examples demonstrate that understanding child anatomy, physiology and psychology are crucial to making products and environments safer through primary prevention activities. From a public health perspective, there is a need to develop and conceptualize child injury prevention as a continuous integrated set of activities.

Box 1: Interventions proven to work from available evidence

Road Traffic Injuries[21]	Drowning[76]
• Increasing the legal age of motorcyclists and drivers from 16 to 18 years • Enforcing motorcycle/bicycle helmet laws • Graduated driver licensing systems • Daytime running lights on motorcycles • Child-passenger restraints • Speed control measures • Restricting use of cell phones while driving • Restricting use of alcohol and addictive substances • Increasing safety inside and outside vehicles • Making road environment less accident prone and user friendly	• Instilling barriers to control access of children to water bodies • Providing safe places (for example, a crèche) away from water for preschool children, with capable child care • Teaching school-age children basic swimming, water safety and safe rescue skills • Training bystanders in safe rescue and resuscitation • Signages around water bodies and increasing safety vigilance • Setting and enforcing safe boating, shipping and ferry regulations • Increase security and supervision near water bodies
Falls[83]	**Poisoning[89]**
• Child resistant window bars/grills in all buildings • Anti-skid floorings in houses, schools, indoor play sites, etc. • Developing and enforcing standards for the design and maintenance of safe playgrounds, including installation of rubber or bark ground surfacing of sufficient depth and the incorporation of safe heights for climbing structures and equipment such as slides	• Safe storage of drugs, pesticides and other toxic products at home and in schools • Child resistant containers for medicinal products • Strong labeling practices • Manufacturing less toxic products • Prominent labelling of dangerous products • Restricting access to dangerous products

Trauma care activities[21, 60]	Burns[62]
• Sustained surveillance systems • Education and environmental interventions • Appropriate trauma care programmes that focus on pre-hospital, in-hospital and rehabilitation activities • Suitable rehabilitation programme	• Replacing kerosene stoves with safer lamps and stoves • Design and construction of safer kitchens • Installation of smoke alarms • Using fire-retardant household materials • Raising cooking facilities off the ground; • Separating cooking areas from living areas • Home safety education and safety checks •Safety equipment •Banning fireworks

Figure 35: Framework for child injury prevention

Some of the interventions listed above for prevention of specific injuries have been implemented in isolation or in togetherness and are shown to be effective. However, a framework as shown in Figure 34 is essential for formulating and implementing effective interventions. Beyond doubt, implementation is the key to achieve success in child injury prevention. Such a framework includes the development of the presence of a lead coordinating agency, child safety policies, action plan for effective implementation, setting goals and targets based on research and information systems, use of appropriate technology, availability of dedicated funding along with capacity building of all stakeholders and others. It also requires enacting appropriate standards/legislations/regulations, continued advocacy directed towards all stakeholders and the society at large, and engagement of civil society and community engagement. It is crucial that these approaches are developed on a multi-sectoral platform as child injury prevention is the responsibility of several ministries/departments and agencies at present. Needless to say, the highest level of political commitment and support is very critical.

2. Policy, legislations, guidelines and enforcement matters

As child injury prevention and safety promotion are the responsibilities of several ministries/departments/ agencies, the implementation is complex and dependent on active participation and inter-sectoral coordination.

A national/state agency in a coordinating nodal position to guide, direct, coordinate, fund, implement and evaluate activities on a regular basis is the need of the hour to implement child injury prevention. This is required to ensure that legislation and policies are implemented and monitored at National and state level.

A policy is typically described as a principle or a tool to guide decisions and to achieve expected outcomes. A policy can be considered as a 'statement of intent' or 'a commitment' and lays down a roadmap for all future activities by providing a vision and mission.

Child safety and injury prevention policies provides a basis for Govt. action to help increase awareness, guide action and generate consensus for implementing a framework for action, defining roles and responsibilities, engaging partners and bringing focus to all the activities that need to be developed.

As there are no dedicated child safety and injury prevention programmes in India at the moment, few ministries have taken a lead to address these issues. The Ministries of Health, Education, Transport, Social Welfare, Women and Child Development have initiated some programmes that are specific to children (Box 2). Capacity building of policy makers is important to make them aware about child safety issues.

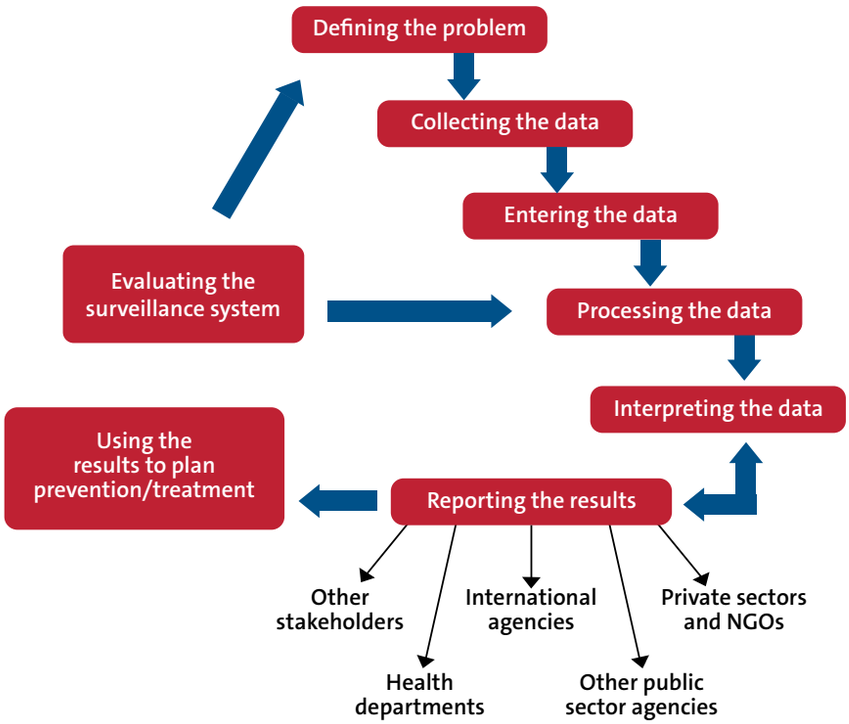
Undoubtedly, all child safety and injury prevention activities need to be evidence-based and data driven for effective outcomes. At present, data on child injuries is very limited and problems exist in data availability, collection, analysis, interpretation and utilization (Figure 36). Policies should focus on strengthening injury surveillance among children and use the data to further strengthen policies and legislations.

Strengthening of existing systems, surveillance of child injuries, registries in select institutions and surveys should be considered by national agencies to bridge gaps in the current scenario.

Box 2: Councils/Legislations (directly/indirectly related to injury prevention and safety promotion)

Ministry	Councils/Legislations (directly/indirectly related to injury prevention and safety promotion)
Home Affairs	National Council for Protecting Child Rights[106]
Women and Child Development	POSCO - Protection of Children from Sexual Offences Act 2012[107] Juvenile justice (Juvenile Justice Act, 2000)[108]
Labour	Child Labour Prohibition and Regulation Act, 1986[16] The Indian Factories Act[109]
Education	Right to Education Act[110]
Road Transport and Highways	Guidelines on Safety of School Buses[111] Motor vehicles amendment bill 2019
Ministry of Health	Rashtriya Kishor Swasthya Karyakram (RKSK)[112] Drugs and Cosmetics Act
Ministry of Home affairs	Several provisions in Indian Penal Code

Figure 36: Steps in surveillance



The health sector should lead this effort along with other sectors, not only to identify the distribution and determinants of child injuries, but also on products and environments which children routinely use, to delineate harmful products and unsafe environments for corrective measures.

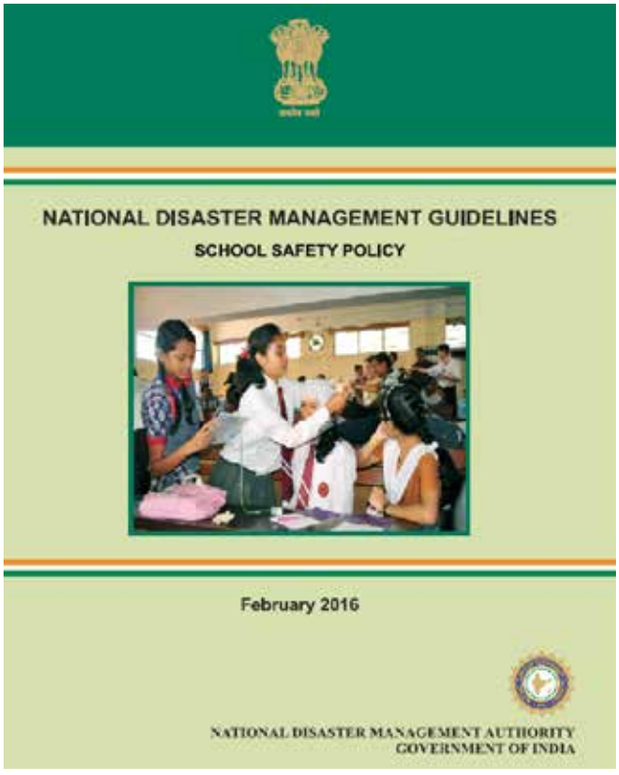
Legislation is a powerful tool and can deliver results when properly implemented. In India, injuries are medico-legal events, as per different sections of Indian Penal Code and all such events are to be registered with local police authorities, followed by criminal proceedings. Detailed discussion on merits and demerits of this approach in the field of injury prevention is beyond the scope of this report. Considering the seriousness of the issues, the Indian judiciary has laid down directives for different authorities to improve the situation and to prevent its future occurrence. The impact of these legislations has not been evaluated till date and calls for more research in this area. Some examples of recent guidelines and legislations are given as examples.

Guidelines for School Safety under Section 19 of RTE Act (October 2014)

The Ministry of Human Resource Development and Department of School Education and Literacy recommended 'Guidelines for safety and security of children' on 9th October 2014 urging states to adopt/ implement the same at a state level. These guidelines were based on legal provisions under Section 19 of Right of Children to Free and Compulsory Education (RTE Act, 2009). In line with Section 19, the 'Guidelines for safety and security of children' specified parameters pertaining to the location of the school, safe approach to schools, transportation management, norms for school building, safety in school campus (electric cables, wires, playground safety, monitoring secluded places) and classroom infrastructure (secure windows, ventilation, safe flooring). In addition, the guidelines covered the training of school staff in safety and first aid and described their roles in managing safety in schools. The guidelines also recommends conducting regular school safety audits and directed the states to prepare standard school safety assessment checklists and issue No Objection Certificate for schools for safety[110]. More details available at https://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/20141014_131513.pdf.

National Disaster Management Authority School Safety Policy Guidelines (February 2016)[95]

The National Disaster Management Authority School Safety Policy focuses on institutional strengthening at state and district levels, by formation of school safety advisory committees. As per the guidelines, recognition certificates are issued to those schools which comply with the norms of the building code. The District Education Officer, designated regulatory authorities at the district level and the block officers monitor safety parameters in all schools on a regular basis. The guidelines clearly specify implementation of safety actions and infrastructure at school level for both structural and non-structural actions. They focus extensively on capacity building, training processes and risk monitoring at a school level[95]. More details available at https://ndma.gov.in/images/guidelines/School-Safety-Policy.pdf

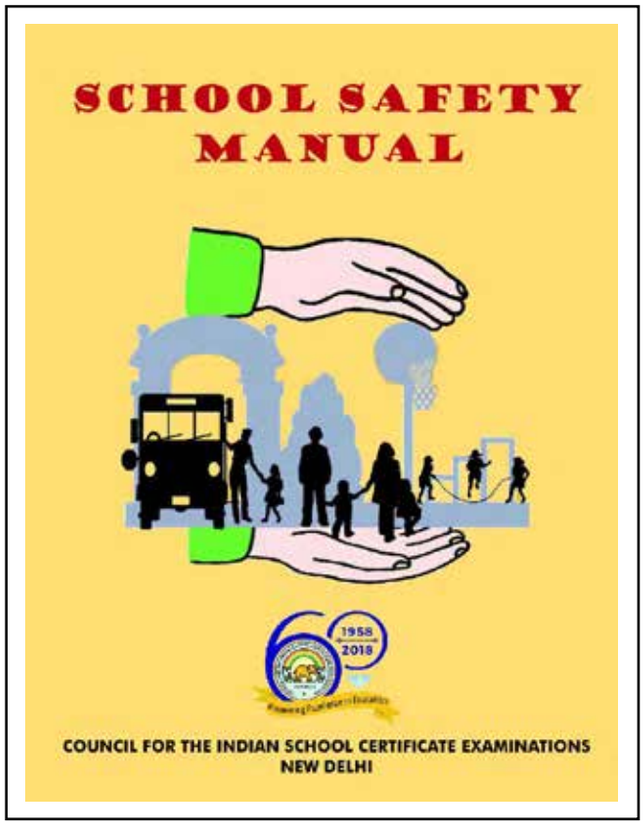


National Building Code (2016 version)[95]

The National Building Code of India provides detailed guidelines for construction, maintenance and fire safety of structures and is a recommended document published by the Bureau of Indian Standards (BIS). States are required to incorporate the recommendations of the National Building Code into their local building bylaws making the recommendations of the National Building Code of India as a mandatory requirement. In April 2017, advisories were issued to all State Governments to incorporate and implement "Fire & Life Safety" in their building bylaws. These details dictate standards for fire safety, adequate smoke exhaust systems, emergency lighting, emergency exits, fire alarm systems, fire fighting systems and adequate storage of water supply and sand to suspend the spreading of fire. It mandates that schools obtain a safety certificate or NOC from the fire safety department[95]. More details available at https://www.karnataka.gov.in/ksfes/Documents/Group%20B%20Sub%20Division%20B1%20to%20B2%20Education%20Building.pdf

Guidelines for School Infrastructure and Strengthening (CIVIL WORKS) (December 2014);
Rashtriya Madhyamik Siksha Abhiyan (RMSA) [97]

The Rashtriya Madhyamik Siksha Abhiyan (RMSA) has provided Guidelines for School Infrastructure and Strengthening (Civil Works) to enhance access to quality education. Infrastructure support guidelines are specified in five categories viz. opening of new secondary schools or upgradation of upper primary schools to the secondary stage; strengthening of existing secondary schools, girls hostel; vocational training centres; major repair for school building and teachers' quarters[97]. More details are available at http://rmsaindia.gov.in/images/School_Infrastructure_and_Strengthening.pdf



Supreme Court of India: Guidelines for transport safety of children (1997)[111]

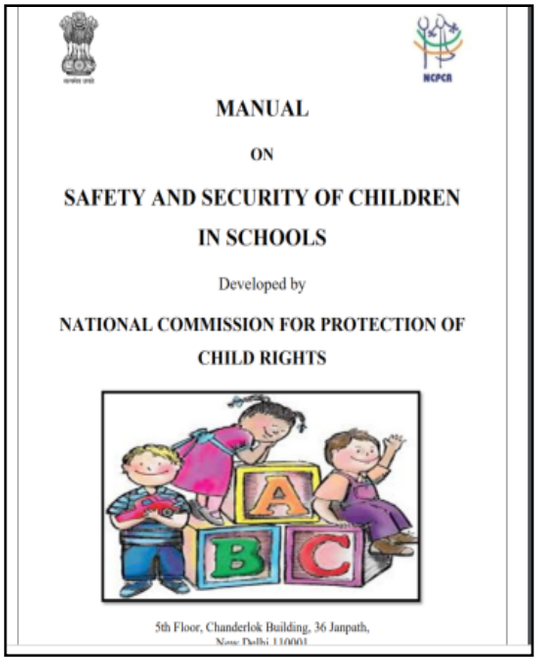
The Honourable Supreme Court of India, in a judgment dated 16/12/1997, included guidelines for safe plying of school buses and to ensure safety of school children travelling by bus. The guidelines specify the interior and exterior features of the school bus, facilities to be provided in the bus, permits to be availed and role of school managements[111]. More details are available at http://ddeehmr.org.in/supreme%20court%20guidelines%20on%20child%20safety%20in%20schools.pdf
UploadedFiles/20180421065101950514755CISCE%20School%20Safety%20Manual.pdf

Council for Indian School Certificate Examination (ICSE): School Safety Manual (2018)[93]

Apart from existing guidelines, the ICSE school safety manual focuses on sections pertaining to safety planning, developing school-level disaster management plans, formation of safety sub-committees in schools, securing perimeter of schools, psychological and emotional wellbeing including prevention of violence, abuse and safety for children with special needs[93]. More details are available at https://www.cisce.org/UploadedFiles/20180421065101950514755CISCE%20School%20Safety%20Manual.pdf

Manual on Safety and Security of Children by National Council for Protection. of Child Rights[112]

The Ministry of Home Affairs in association with NCPCR (National Council for Protecting Child Rights) developed a manual on Safety and Security of Children in Schools which is quite elaborate and comprehensive[112]. More details are available at http://ncpcr.gov.in/showfile.php?lang=1&level=1&&sublinkid=1397&lid=1550



The labor ministry is in charge of protecting children from child labor[16] and also from child trafficking. The Indian Factories Act promulgated by the Ministry of labor[109] is a large social welfare act that specifies issues pertaining to the employment age of children, their social security, injury prevention and compensation.

Rashtriya Kishor Swasthya Karyakram (RKSK)[112]

The Ministry of Health & Family Welfare has launched a health programme for adolescents (10-19 years), in January 2014, to target nutrition, reproductive health and substance abuse, among other issues. One of the objectives of this programme is the prevention of injuries and violence by promoting favourable attitudes among adolescents[112]. More details are available at https://www.nhp.gov.in/rashtriya-kishor-swasthya-karyakram-rksk_pg

The Motor vehicles amendment bill 2019[112]

The motor vehicles (Amendment) Bill, 2019 was cleared by the Rajya Sabha on 31st July, 2019 imposing strict penalties on violation of traffic rules in the country. The Motor Vehicles (Amendment) Bill, 2019 is based on the recommendations of the group of transport ministers of states constituted by the Ministry of Road Transport & Highways to address the issue of road safety and to improve the facilitation of the citizens while dealing with transport departments. Among the few amendments made to the bill, with particularly reference to children are penalties for traffic violations, cashless treatment, constitution of national road safety board and national road safety fund. The guardian/owner shall be deemed to be guilty for offences by juveniles.

School safety in India - Policy growth

School safety in India received more emphasis with onset of Sarva Shiksha Abhiyan (SSA) which addresses issues beyond compulsory education. Nearly one-third funding is utilized for infrastructure development in SSA where safety is also addressed as part of school development plan. Safety received further boost with the linkages of SSA with disaster risk management programme, as a collaborative effort between Government of India and UNDP, where school-level disaster management plans, mock drills and capacity building has been conducted (Source: UNDP, 2007). The SSA framework in schools also implemented disaster management in school level.

Coherently in year 2005, the National Building Code of India (NBC), published by the Bureau of Indian Standards serves as a Model Code for adoption by all agencies involved in school infrastructure works. The code covered structural design depending on the functional use of the structure, characterized by hazardous consequences of its failure. The Hon'ble Supreme Court of India has also come out with its judgment in support of school safety, and insisted on adherence to NBC standards in school building specifications and construction. The Hon. Court also stated that "Right to education incorporates the provision of safer schools" and should include fire safety, training of school teachers/other staff, school building specifications, clearances and certificates related to safety. Subsequently the National Disaster Management Authority (NDMA) implemented the National School Safety Project in 22 states. The National School Safety Policy was developed and capacity building was facilitated to strengthen safety and preparedness in schools.

In 2014, the Department of Education put forth guidelines on safety and security of children in schools and state govts. were advised to implement the same in their respective states. The state government body Sarva Shikshana Abhiyan has adopted the Child safety manual developed by NCPCR on their official website under the intervention part of school initiatives/ programmes.

School safety policies in states

Following series of untoward incidents in schools, intentional injury prevention and safety promotion has again gained prominence. Various state governments have taken initiatives to strengthen safety in schools. The Govt. of Assam made it compulsory for all schools to have a Disaster Management Plan and to hold mock drills at regular intervals. The Govt. of Gujarat, initiated two programmes namely Gujarat School Safety Initiative – I & II, for promoting a culture of disaster safety preparedness in schools and reduce risk through structural and nonstructural measures in the schools. Similarly, the states of Himachal Pradesh, Harayana, Tamil Nadu, Delhi to name a few implemented the same thereafter. The states of Delhi and Karnataka have developed and are implementing checklists for regular assessment of safety levels in schools. However state level policies and guidelines are limited. Karnataka has developed a comprehensive guideline and a policy/legislation to ensure safety of children and in January, 2018, passed a notification of draft rules which includes safety and security of students. Also the notification had the checklist titled "Measures for Safety and Security for Students".

The Protection of Children from Sexual Offences Act (May 2012)[107]

The POSCO Act[107] strengthens legal provisions for the protection of children from sexual abuse and exploitation (intentional injuries). The Act provides for stringent punishments, establishment of Special Courts for trial of offences and incorporates child-friendly procedures for reporting, recording of evidence, investigation and trial of offences. The act also specifies process for relief and rehabilitation of the affected children and mandates the Central and State Governments to spread awareness about the Act. The National Commission for the Protection of Child Rights (NCPCR)[95] and State Commissions for the Protection of Child Rights (SCPCRs)[107] have been made the designated authorities to monitor the implementation of the Act[107]. The Act has been further strengthened with amendments in July 2019. More details are available at [https://wcd.nic.in/sites/default/files/childprotection31072012.pdf] [https://childlineindia.org.in/pdf/POCSO-ModelGuidelines.pdf

3. Integrated approaches are useful

Implementing an identified solution/mechanism/pathway requires a basic understanding of 'what works?' and 'how to make it work?' The standard approaches of education, engineering and enforcement with emergency care, based on 4 E's, need to be extended and a combination of these approaches should be put to work as they complement each other. Global experience has demonstrated that making safer products and developing safer environments is a better choice as compared to just informing parents or talking to children alone about safety issues. Every product that is made for a child should be safe and the potential hazards of such products should be communicated to parents, teachers, caregivers and others.

4. Need for strengthening trauma care programmes

As injuries continue to occur, strengthening trauma care can have a far-reaching impact on all types of injury as well as on other medical and surgical conditions. Efficient trauma care aimed at 'getting the right child to the right place at the right time for right treatment' is a proven strategy for reducing deaths and hospitalization. Hospital care and rehabilitation programmes are required to ensure that an injured child is saved from death. Several components like availability of first aid, early transfer to hospitals, triage systems, training of doctors and nurses, guidelines/protocols, bringing quality of care and trauma audits are critical to the success of such programmes.

Many children discharged from a hospital have to live with varying disabilities depending on the extent and nature of injury. Child-centered rehabilitation programmes for injured children are grossly deficient in India, as this discipline is in the embryonic stages of development. Rehabilitation of children's disabilities due to injuries should be well integrated within existing activities

5. Monitoring and evaluation are central to measure success

Monitoring and evaluation are critical in measuring success of programmes or a policy or an action plan. There is a need to track changes, identify emerging trends, monitor the impact of intervention as well as set guidelines for future activities. The progress made with regard to implementation needs to be measured in actual reduction of deaths, injuries and hospitalization rather than the number of programmes using both quantitative and qualitative indicators.

6. Challenges for implementation

Injury prevention and safety promotion, including child safety (with some unmeasured progress in school safety, safe travel to school and child sexual violence through the intervention of judiciary) has largely been slow in India. The absence of a national programme, policy, budget, human resources and others are the prime factors along with lack of coordination mechanisms and the absence of a central/state coordinating authority or body. Each specific injury has its own specific challenges for implementation, depending on socioeconomics, topography and culture.

Challenges to implement safety interventions in schools

- Low priority for safety in a packed schooling curriculum.
- State versus centre dilemma: Laws are passed centrally but enforcement is by state governments.
- Limited inter-sectoral coordination between various government departments.
- Human resource shortages and maldistribution.
- Limited financial outlay (or dedicated budget) for safety in public and private schools.
- Lack of basic infrastructure for safety in many low resource schools.
- Correcting hazards and safety issues around schools is beyond concern of the school; This is a challenge as schools do not have a key role to play here.
- No notification or surveillance system in place at school level.

Section 4: Recommendations

Injury prevention and safety promotion should be a national agenda.

- India does not have a national injury prevention policy/programme or an action plan. It is a prerequisite that child injury prevention needs to be on the public health agenda at both national and state levels and should be given highest importance.

Integrate child injury prevention component in all national programmes/health programmes concerning children

- National policies/programmes addressing child health Reproductive and Child Health programme, Rashtriya Kishor Swasthya Karyakram (RKSK), Integrated Child Development Services, Sarva Shiksha Abhiyan, National health Policy, etc. need to integrate child injury prevention components in their respective activities. This will enhance coverage of injury prevention interventions.

Data systems need strengthening

- The existing data systems in India within police and transport sector needs to be strengthened to obtain good quality data and to be used for child injury prevention programmes. Both police and hospital sources have serious limitations and injuries are highly under-reported.
- Specific and focused child injury epidemiological research based on surveillance, registries, risk factor studies, product safety studies and other areas along with its integration in the existing health management information system needs to be implemented.

Promote favourable (policy) environments for manufacturing, sales and easy access to standard and good quality safety equipment (for children)

- Good quality safety products to be used in houses, schools, play grounds, vehicles, roads and communities are resource intensive at times, thereby limiting their widespread use. Complaince among all sections of the society can be enhanced by promoting policy, taxation changes to facilitate financial acess to technologies. Social marketing can be adopted to facilitate community use of the technologies.

Dedicated programmes are required

- Considering the fact that transport injuries, falls, burns, poisoning, drowning and intentional injuries like child sexual abuse are on the increase, dedicated programmes in each of these areas developed on a combination of engineering, safer products, enforcement, education and emergency care needs to be developed and implemented by the individual states of India.
- Setting-based approaches need to be piloted to deliver targeted interventions for children in school, workplaces and in less resourced communities.

Strengthen capacity of implementing agencies

- The implementation of several existing guidelines/ regulations/standards requires capacity strengthening of concerned authorities for visible-uniform-random-people friendly mechanisms.

Choosing the right intervention

- The larger goals of injury prevention and safety promotion are to see that injuries do not occur in the first place; even if it occurs, injuries should not lead to serious injuries, hospitalizations and disabilities. Furthermore, it is important to see that the injured child is rehabilitated to return him/her back to his/her optimum level of functioning.
- Children live in a world that is largely designed by adults for adults. The needs, vulnerabilities, susceptibilities and capabilities of children are largely ignored or paid lesser importance in development of products and creation of environments. Expecting children to behave safely on their own is considered unrealistic as it is dependent on their age, understanding and perceptions of safety. The experience of many high income countries has revealed that child injuries, like injuries in other age groups, are predictable and preventable.
- The approaches to child injury prevention are based on making safer products which children use, creating safer environments that are less injurious where children live and by informing/educating parents/ caregivers and all others to take adequate actions for the safety of children – all towards keeping children safe. A combination of approaches based on education, enforcement, engineering and emergency care should be employed in this process.
- The safe system approach in recent years builds on these approaches by considering the childhood characteristics, vulnerability and susceptibility of children and responsibility of all stakeholders at different levels towards making children safe and to prevent injuries. Policies, programmes, regulations, legislations, setting and enforcing standards, awareness building programmes at different levels and others, are several tools employed in this process.
- A child normally spends its day at home, on road, in vehicle, in school, in play area and others. In all these places, children come in contact with variety of products that can lead to an injury or unsafe environments that can enhance the occurrence of injuries. While it is important to make every product safe and less injurious, the larger environments where children spend time can be made safer.

Road safety

Towards making children as safe road users

- Increase awareness among parents and caregivers on road safety.
- Educate students (above 12 years) about use of helmets, seatbelts, excessive speeding, driving under the influence of alcohol and drugs, mobile phone use, being safe pedestrians, benefits of using day time running lights (it is automatic in many vehicles now), having a proper license and others on a regular basis. Inform them about existing laws, penalties and educate them to be compliant on these aspects.
- Child specific protective and safety equipments (helmets, restraints, visibility clothing, etc.) can be made available in schools and enforced to use as per existing legislations.
- Inform local police authorities to enforce laws on helmets, seatbelts, child restraints, speeding, mobile phone use and others in your areas and in cities.
- Conduct school-based driver education programmes for school bus drivers, autorickshaw drivers and others.
- Inform parents about use of child restraints, encourage them to use and follow legislations; educate parents about dangers of carrying children in the front seat of cars.
- Parents/caregivers/school vehicle drivers to be made aware of dangers of speed and to follow legislations on speed related matters.
- Encourage children to use visibility enhancing materials on roads.
- Increase compliance to traffic rules among children
- Encourage all adults to be good role models for children on road safety issues.

Safer roads

- Adopt safe road design around school premises that accounts for needs and requirements of children.
- Inform and work with local administrative bodies to implement speed reduction strategies like setting speed limits to less than 30 kms, appropriate display of signages, enforcement of speed limits, erecting speed bumps at frequent intervals, elevated pedestrian crossings as well as education of parents, caregivers and drivers to be implemented in areas near schools.
- Roads should be free of potholes, manholes, unsafe roads around schools and should have safer footpaths, pedestrian crossing facilities, increased visibility and supervised road crossing facilities.

Safer vehicles

- Inform parents and encourage children to travel in school buses or public transport vehicles (arrangements to be made).
- Ensure complete compliance of school buses to the Supreme Court guidelines;

Steps for safer home environment to prevent child injuries

- All residential dwellings should be built with safety in mind and should adhere to safety standards.
- All young children should be supervised at all times and in all places by parents and caregivers.
- All products made specifically for children like toys, play materials, cycles, and others should be made safer and certified by safety authorities.
- Standards with regard to balconies, terraces, staircases with railings and grills should be strictly enforced.
- Encourage use of anti-skid resistant flooring materials.
- All electrical products should be made safer and not to be within easy reach of children in homes.
- All dangerous products like unused medicines, detergents, kerosene, stoves, lamps, inflammable substances, hazardous chemicals, cleaning agents, rat poison/mosquito repellents, cockroach repellents, insecticides and pesticides and other products should be kept out of reach of children.
- Restricting use of injury producing products and replacing with energy absorbing materials.
- Parents and caregivers should be informed of potential dangers at home and to be encouraged to take proactive measures.

Steps to prevent drowning among children

- Parents/caregivers/public and security personnel should be informed about the potential dangers of children entering watery bodies.
- Parents and caregivers should continuously supervise their children as long as children are in water.
- All public watery bodies like swimming pools should be supervised at all times. Similarly, all places like swimming pools, play sites, play areas in and around homes should confirm to requisite safety standards.
- All watery places like sumps, wells, open watery drains to be covered at all times.
- Children should be encouraged to learn swimming from an early age so that they can protect themselves and help others at times of need.
- Display messages/warnings/instructions should be put up near all watery bodies to alert the public.
- Safety devices like life vests and other floatation devices should be available at all times when children enter water.
- Special precautions as informed by disaster management authorities should be followed at times of natural disasters like cyclones, floods, etc.

Steps to prevent playsite/recreational injuries among children

- Parents/caregivers/public and security personnel should be informed about the possibilities of children sustaining injuries and to be constantly vigilant.

- Parents and caregivers should continuously supervise their children as long as children are playing in recreational areas.
- All public recreational places like parks , playgrounds, open fields should be supervised at all times.
- Notification about the type of play site materials should be prominently displayed. The timings and type of activities, do's and don't's should be prominently displayed in these places.
- Energy absorbing materials should be used in all play sites to minimize the impact of an injury.

Advocacy and awareness are highly essential

- A wide variety of professionals including public health experts, pediatricians, trauma care professionals, social scientists, legal experts, child psychologists and others need to strongly advocate for child safety to facilitate the development of child injury prevention policies and programmes. Furthermore, professionals need to get engaged on a regular basis to increase awareness among politicians, policy makers, professionals, media, judiciary, parents and caregivers and other stakeholders to adopt safety programme and activities.

Dedicated funding is vital

- With no specific ring fenced budgeting for road safety or for prevention of child injuries in India, there is limited concerted action. In the year 2018-19, 3,150 million rupees were allocated for road transport and safety which is 0.4% of budget of MoRTH. There is a need to increase specific funding and spending on safety.

Inter-sectoral coordination is the need of the hour

- Injury prevention is a cross-cutting issue involving departments of home, transport, education, health, social justice, youth empowerment and others. There is a need for creating mechanisms and institutional approaches between the different ministries/ departments to realize cost-effective outcomes and reduction in deaths and disabilities.

Policies, law, safety standards and guidelines need innovative enforcement and implementation

- Over time, the response to the increasing problem of injuries has been fragmented and piece meal that has resulted in the enactment of legislations/regulations/ guidelines by the government and the judiciary to safeguard the interest and safety of children. However, enforcement and implementation have been a challenge. Innovative, comprehensive technology based and acceptable strategies for enforcement and implementation of existing laws, policies and programmes is very much required.

Strengthen trauma care systems to provide quality peadiatric trauma care services

- Trauma care systems in hospitals need strengthening as per WHO essential guidelines for trauma care. Triage systems, human and physical resources, treatment protocols, guidelines specific to child trauma care needs to be established across level 2 and 3 trauma care facilities across the country.Early first aid, safe transportation, appropriate referrals, triage systems, trained professionals, good management practices and appropriate referrals needs to be established in all ER rooms in India.

Improving trauma care

- Every school should have a designated safety coordinator to coordinate, conduct and monitor safety activities.
- All teachers should be trained in basic knowledge of safety principles and first aid (as first aid responders) through formal training courses.
- All schools should have a usable and functional first aid kit to provide first aid in emergencies.
- Emergency telephone numbers should be prominently displayed at strategic locations in every school.
- Networking with local police and nearby hospitals for early trauma care should be in place.
- All schools should maintain student health records with a focus on injury details of every child.

Rehabilitation programmes need strengthening

- Rehabilitation services for children affected by trauma needs to be strengthened by establishing continuous and coordinated activities between departments of social justice, education and health, across the country. Data regarding disabilities among children with injuries and outcomes of rehabilitation services needs to be strengthened at all levels to implement evidence based programmes including Community Based Rehabilitation (CBR).
- School based rehabilitation programmes should be encouraged in all schools to the possible extent.

Monitoring and evaluation are central to measure programmes

- All programmes and activities should be systematically monitored using good quality data to measure progress. These activities should not just count on programmes but focus on quality and actual reduction in deaths and injuries.

Child safety and injury prevention needs a serious consideration from all policy makers and professionals along with highest political support. Needless to say, children should not die or become disabled nor seek care in health care institutions for conditions that are predictable and preventable. It is time to act.

Annexures

Table 1: Data sources for Injury information

Report/study	Source	Injuries	Strengths	Limitations
Medical Certification of Cause of Death	Office of Registrar General of India.	Child proportion of deaths and causes	Cumulative reports from urban hospitals	Covers only deaths in urban medical institutions and not uniform across the states.
Accidents and suicides in India	National Crime Record Bureau of Ministry of Home Affairs	Deaths and injuries Cause of injuries Age distribution Gender distribution	Based on police reported data collated from all state crime record	Coverage, completeness and quality of data are unclear. Under-reporting
World Health Statistics-2015	World Health Organization	Estimates of number of deaths, injuries and cause of injury deaths	Information on indicators in a comparable manner across countries and conditions	Estimates based on data provided by the respective countries. Data systems differ widely across countries in validity and reliability
Global Burden of Disease data estimates	Morbidity estimation was based on multiple data sets, and seven follow-up studies with patient-reported long-term outcome measures.	Death rates per population Age distribution Gender distribution Cause of injuries DALYs Risk factors	Uses available data sources and applies statistical methods to arrive at estimates. Provides wide information regarding mortality, rates, DALYs and risk factors in an internationally comparable manner Amenable for comparison between other causes of child death	Estimates are based on data provided from different sources, differing widely in design and methods
Million Death Study	Nationally representative mortality survey of 1.1 million households	Deaths Injuries Death rates Causes of injuries	Population based study using verbal autopsy methods	Reporting of events by people and based on time to recall
Isolated injury surveillance pilot projects	Primary data from injury surveillance projects in Bengaluru, Tumkur, Kolar, etc.	Wide range of information	Provide valid and complete information Major source of risk factors, treatment and outcomes	Limited in geographical coverage Not regular sources Project mode of operation
Other research studies	Conducted by independent researchers	Wide range of information	Address many topics	Vary by objectives, sample, study population, designs and inferences Limited in coverage

Table 2: Causes of injury deaths - Evidence from independent research studies

Authors	Year	Sample	Place	Setting	Age Group	Burns	RTI	Poisoning	Falls	Animal Bites	Cuts	Others	Drowning
Hemalatha & Prabhakar	2018	410	Tirucharapalli	P	<18	6.90%	6.90%	-	-	17.0%	8.60%	15.10%	-
Mathur et al	2018		Ujjain	P	<18	16%	-	10%	-	-	71%	-	2%
Vani et al	2007		Bengaluru	P	<18	2%	12%	-	66%	16.0%	4%	-	-
Aggarwal et al	2009	699	Punjab-Rural	P	<15	16.20%	-	-	44.30%	-	-	-	-
Mirakazemi & Kar	2014	9014	Pune	P	<15	3.70%	49.50%	2.30%	24.90%	8.6%		11%	-
Bhuvaneswari et al	2018	622	Delhi	P	<14	13%	-	-	59.50%	-	20%	-	-
Inbaraj et al	2015	1600	Vellore	P	<14	13.80%	27.60%	-	43.10%	-	-	15.50%	
Gururaj G et al	2012		India	P	<14	9%	34%	4%	4%	5.0%	-	16	17
Mohan et al	2009	22883	Haryana	P	<14	9%	25%	-	35%	6.0%	-	12%	-
Yadav et al	2018	440	Moradabad	P	1-5	6%	14%	-	48%	6.0%	-	9%	3%

P= population

Table 3: RTI - Evidence from research studies

Sl no:	Author	Year	Setting	Place	Sample	Age	Studies	Findings
1	Jagnoor et al.,	2012	P	All India	8023	0-14	Children	16.5% of all unintentional death was due to RTIs Standardized mortality rate of 16.5 /100,000 with male and female rates of 26.3 and 6, respectively
2	Hemalatha et al	2018	P	Tiruchirappalli	410	0-18	Children	6.9% of all injuries were due to RTIs
3	Vani et al.,	2016	P	Bangalore	797	<18	Children	12% of all injuries were due to RTIs
4	Inbaraj et al.,	2015	P	Vellore	1600	0-14	Children	27.5% of all injuries were due to RTIs
5	Paramesh-waran et al.,	2016	P	Urban Delhi	745	0-17	Children	18.9% of all injuries were due to RTIs
6	Reddy et al.,	2012	P	North India	17	0-14	Children	35% of all injuries were due to RTIs

7	Babu et al.,	2016	H	New Delhi	300	<18	Admission in trauma surgery	43% admissions due to RTIs
8	Mallikarjuna et al.,	2016	H	Davengere	195	1-18	RTI admissions	85 % of RTIs resulted in complicated injuries
9	Celine & Antony	2014	H	Ernakulam	873	5-14	Hospital admissions	11.39% children were admitted due to RTI
10	Verma et al.,	2008	H	New Delhi	137	2months – 12	ER -room	16% ER admissions due to RTI
12	Kadam	2015	A	Maharashtra	404	0-10	Autopsies – fatal head injuries	3.4% of fatal head injuries due to RTI
13	Shetty et al.,	2012	A	Manipal	633	<10	Autopsies	1.2% of all autopsies were due to child RTIs RTI deaths=36.3% of all injury deaths
14	Tandle & Keoliya	2011	A	Yavatmal, Maharashtra	138	0-10	Autopsies – (RTI)	2.3% of autopsies of fatal RTIs with head injuries were children

P= population, H= hospital based studies, A= autopsy

Table 4: Burns mortality in hospital and population settings - Evidence from research studies

Sl. No.	Author	Year	Setting	Place	Sample	Age	Findings
1	Dhopte et al.	2017	H- Burns Unit	North India	475	0-18	Case fatality= 31.3%
2	Peddi et al.	2014	H- Burns Unit	Bangalore	900	0-18	Case fatality=20.4%,
3	Bain et al.	2014	H- Burns Unit	Central India	410	0-14	Paediatric admission in burns unit=16.4% Paediatric deaths (0-14 yrs)= 9.4% of all burn deaths Case fatality=21.7%
4	Bhansali et al.	2017	H- Burns Unit	Maharashtra	313	0-12	Pediatric admission=9.8%
5	Vijay et al.,	2013	H	Maharashtra	104	0-14	Pediatric admissions=21.5%
6	Jagnoor et al.	2012	P	All India	8023	0-14	3% of all unintentional deaths Standardized mortality rate= 3 per 100000 (Male=1.8; Female=4.2)
7	Mohan et al.	2009	P	Haryana	9035	0-14	Incidence of non-fatal burns=0.65%

P= population, H= hospital based studies

Table 5: Age distribution - Drowning

Studies	0-4 years	5- 9 years	10-14 years	15-18 years	Variable studied
GBD -2017	54.5%	26.2%	19.3%	NA	Deaths
NIMHANS (Gururaj et al)	8.80%	16.50%	27.50%	47.30%	Deaths
Veetil et l	5.30%	32.20%	62 % (10-16 years)		Non-fatal drowning
Mathur et al	36%	28%	36%	NA	Non-fatal drowning
Dandona et al	18.50	14.20	3.10	NA	Death rate per 100,000

Table 6: Drowning in children - Evidence from independent studies

Sl.no	Author	Year	Setting	Place	Sample	Age	Studies	Findings
1	Pathak et al.,	2018	P	Ujjain	1049 (injuries)	0-18	Children	2.38% incidence due to drowning
2	Jagnoor et al.,	2012	P	All India	8023	0-14	Children	Death per 100,000 population=6.4 (Male=8.2, Female=4.6)
3	Mohan et al.,	2009	P	Haryana	9035	0-14	Children	0.4% of injuries due to drowning
4	Dandona et al.,	2018	P	Bihar	224077	1-14	Children	% deaths in age: 1-4=7.25%; 5-9=12.5%; 10-14=5.8% Incidence of drowning deaths per 100,000 children=14.3 (Male=11.8, Female=11.1)
5	Verma et al.,	2008	H	New Delhi	225	< 12	ER admissions	1% due to drowning
6	Kaur et al.,	2016	H	Ludhiana	100	<10	All domestic injuries	Among all home injuries 10.20% of injuries are due to drowning
7	Veetil et al.,	2017	P	Kerala	8433	<5-16	Children	342 (4.5%) had a history of drowning
8	Bannerji et al.,	2016	P	West Bengal	163	0-5	All domestic injuries	41% of domestic injuries is due to drowning
9	Yadav et al.,	2018	P	Moradabad	440	1-5	Childhood injuries	Among all childhood injuries, 3% were due to drowning

P= population, H= hospital based studies

Table 7: Falls among children - Evidence from independent research

Sl no:	Author	Year	Setting	Place	Sample	Age	Studied	Findings
1	Babu et al.,	2016	H	New Delhi	300	0-18	Admission in paediatric surgery	27% of admissions
2	Hemalatha et al	2018	P	Tiruchirappalli	410	0-18	Children	Falls=43.1 % of all injuries
3	Vani et al.,	2016	P	Bangalore	797	<18	Children	Falls =66% of all injuries
4	Ashwathi et al.,	2017	H	Rural Northwest India	141	0-15	Cases in orthopaedic dept.	Falls=17.7% of all cases Fall from tree (5.6%), height=(0.26%), walking=(25.5%), stairs=(9.21%), other=(0.07%)
5	Inbaraj et al.,	2015	P	Vellore	1600	0-14	Children	43% of all injuries is due to falls
6	Jagnoor et al.,	2011	P	All India	203	0-14	Children (Verbal autopsy)	Falls=10.1% of injury deaths Deaths per 100,000 population Male=5.7 (4.2-7.0), Female=5 (3.7-6.4). Total=5.4 (4.4-6.3)
7	Mohan et al.,	2009	P	Haryana	9035	0-14	Children	Incidence of fall injuries per 100 children=2.35% Falls=34.8% of all injuries
8	Sheriff et al.,	2011	H	North Kerala	400	<12	Paediatric ICU	Falls=17.4% of admissions
9	Bannerji et al.,	2016	P	Hoogli district of West Bengal	163	0-5	Children	Falls=66% of domestic injuries

P= population, H= hospital based studies

Table 8: Type of falls

Sl no:	Author	Year	Setting	Place	Sample	Age	Studies	Findings
1	Hemalatha & Prabhakar	2018	P	Tiruchirappalli	410	0-18	Children	Falls=6.1% of injuries Fall from level=88% Fall from height =12%
2	Ashwathi et al.,	2017	H	Rural Northwest India	141	0-15	Cases in orthopaedic dept.	Falls=17.7% of all cases Fall from tree (5.6%), height=(26%), walking =(25.5%), stairs=(9.21%), other=(0.07%)
3	Behera et al.,	2010	A	South Delhi	174	0-14	Autopsy records	Rooftop=67(38.5%), balcony= 42(24.1%), staircases=12(6.9%), furniture=8(21.3%), win-dow =8(4.6%), wall=3(1.7%), Rickshaw/motorcycle=2(1.1%), ladder=2(1.1%), tree 1(0.6%).
4	Kumaraswamy & Prabhakar	2016	P	Tamil Nadu	128	0-10	Children with domestic injuries	Falls=6.2% of domestic injuries Fall from level ground=75% From height =25%

P= population, H= hospital based studies, A= autopsy

Table 9: Burden of poisoning in children in India - Evidence from independent research

Sl no:	Author	Years	Setting	Place	Sample size	Age	Studied	Findings
1	Debata PK et al.,	2014	H	North India	434	0-18	Autopsy records	6% of deaths among children due to poisoning
2	Ravi Gangal	2015	H	Moradabad	9370	0- 18	All paediatric admissions	1.6% admissions due to domestic poisoning Case fatality=5%
3	Adhikari et al.,	2017	H	Vellore	997	0-16	Poisoning cases in ER	Case fatality 1.4%
4	Mohan et al.,	2010	P	Rural North India	9035	0-14	Children	Incidence=0.02% 0.33% of all childhood injuries due to poisoning
5	Roy et al.,	2017	H	New Delhi	195	0-12	Poisoning cases in ER	Case fatality 2%
6	Akbar Sherriff et al.,	2018	H	Kozhikode, Kerala	400	0-12	Paediatric trauma admission	22.3% (89 cases) due to poisoning

P= population, H= hospital based studies

Table 10: Indicators for monitoring school safety

Sl.	Indicator	Definition	Computation	Source(s) of Data
1	Schools with good level of safety	Proportion of schools with Graded A and above (Safety level >90%)	• Numerator Number of schools with Safety level >90% • Denominator Number of schools assessed • Multiplier 100	• Safety appraisal reports • Primary data collection
2	Percentage of schools implementing SOPs and guidelines (can be provided by state or developed within the school) for safety	Proportion of schools implementing SOPs and guidelines for safety	• Numerator Number of schools implementing SOPs and guidelines for safety • Denominator Number of schools assessed • Multiplier 100	• School records • Minutes of meeting •Visualisation of SOPs and guidelines • Primary data collection
3	Percentage of schools with one or more dedicated and exclusive staff to manage safety activities	• Proportion of schools one or more dedicated and exclusive staff to manage safety activities • It indicates commitment of management to hire human resources for safety management	• Numerator Number of schools with dedicated and exclusive staff to manage safety activities • Denominator Number of schools assessed • Multiplier 100	• Appraisal report • School HR records • Appointment letters
4	Percentage of schools with formally trained teachers or staff in safety and injury prevention	Proportion of schools with formally trained teachers or staff in safety and injury prevention	• Numerator Number of schools with formally trained teachers or staff in safety and injury prevention • Denominator Number of schools assessed • Multiplier 100	• School HR records • Training certificate • Appraisal report
5	Schools with fire safety certificate	• Proportion of schools with fire safety certificate • Implies compliance to fire safety norms in the school	• Numerator Number of schools having fire safety certificate • Denominator Number of schools assessed • Multiplier 100	• Fire safety certificate • School records • Appraisal report
6	Percentage schools with specific road safety programmes	Proportion of schools implementing a specific road safety programme	• Numerator Number of schools implementing a specific road safety programme • Denominator Number of schools assessed • Multiplier 100	Primary data collection

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