

Analysis of Children Road Traffic Accidents and Proposed Measures for Children Safety Improvement in Ho Chi Minh City

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Abstract

In recent years, the number of road traffic accidents, fatalities and injuries have been decreasing, but the figures of children road traffic accidents have been increasing in Ho Chi Minh City of Vietnam. This fact strongly calls for implementing effective solutions to improve traffic safety for children by the local government. This paper presents the trends, patterns and causes of road traffic accidents involving children based on the analysis of road traffic accident data over the period 2010-2015 and the video-based observation of road traffic law violations at 15 typical schools and 10 typical roads. The results are a scientific basis for the city government to formulate solutions to effectively improve traffic safety for children in Ho Chi Minh City.

Keywords: Child traffic accident, accident pattern, accidents cause, traffic safety policy

1. General Introduction

According to WHO (2015), every year, there was more than 186,000 dead children (under the age of 18) in road traffic accidents worldwide (equal to more than 500 dead children per day). In Vietnam, this figure is close to 2,000 children per year (5 children per day) (Vietnam NTSC, 2015). In which, the proportion of dead children who walk alone accounted for 36%, involving traffic accidents by riding bike and motorcycle accounted for about 20%. In the number of nearly 2,000 deaths, up to 50% of children had head injuries, mainly due to the lack of helmet wearing. According to the Ministry of Health, the rate of traffic accident deaths related to children in Vietnam is about 20 per 100,000 children, while the average in South East Asia is 7.4 per 100,000 children, in Europe is 4.2 per 100,000 children. Thus, Vietnamese children are losing their safety when engaged in traffic at an alarming level, very dangerous.

The review of prior studies shows that there is currently a lack of in-depth and systematic analysis of the causes, nature and characteristics of traffic accidents involving Vietnamese children. Up to now, there have been a few numbers of studies on traffic accidents involving Vietnamese children but

only at the level of processing simple statistics from hospitals (Ministry of Health - Traffic Accident Report 2009), or just analyze in some aspects related to traffic safety. For example, La Ngoc Quang (2013) studies the current state of helmets of road users in six provinces of Vietnam including HoChiMinh City (HCMC). Nguyen Thuy Quynh (2010) analyzes the relationship between helmet and traumatic brain injury and the impact of personal and family factors related to child helmet use in Viet Nam.

The purpose of this paper is to present the results of in-depth analysis of the distribution characteristics of child-related traffic accidents over time, space, collision patterns, riders group involving in traffic accidents; the cause, and characteristics of violations on traffic safety regulations of parents and students. Based on the results of the analysis and the review of policy solutions that have been implemented in the country and in the world, the paper proposes some breakthrough solutions to improve traffic safety for children in HCMC. These recommendations can be applied to other cities in Vietnam such as Hanoi, Can Tho city and Da Nang city.

2. Data Collection and Research Methodology

In order to capture the trend and characteristics of traffic accidents related to children, this study uses the detailed traffic accident data collected from the Traffic Police Department (TPD) for 6 years (2010 -2015). To assess the situation and characteristics of traffic violation regulations that could lead to traffic accidents in children, data of this research conducted by video cameras at 15 school gates and 10 typical routes in HCMC. The object to be observed is children (traveling alone or be transported) and the operator of the vehicle. To recommend solutions to improve traffic safety, the study conducted a review of international and domestic experience on traffic safety solutions and policies for children. The research framework is depicted in Figure 1.

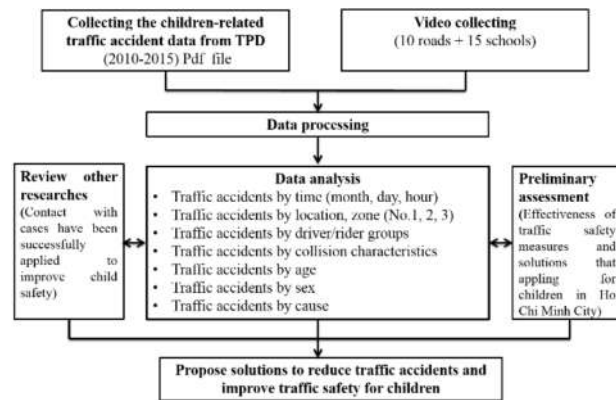


Fig. 1 Research framework

To explore the differences in characteristics and causes of traffic accidents among areas of HCMC, the study divides the city into three zones for analysis (Figure 2).

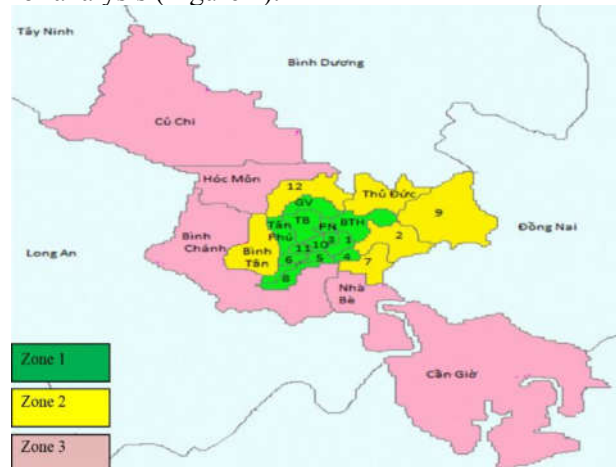


Fig.2 Three zones of HCMC

Table 1 Characteristics of three zones

No.	Criteria	Zone 1	Zone 2	Zone 3
1	Population (million)	3.9	2.16	1.34
2	Area (Km2)	142	352	1602
3	Road area (km2)	8.18	8.48	14.83
4	Road length (Km)	853.47	1017.5	2589.24
5	Length of main road (B ≥7 m)(km2)	592.42	542.71	300.6
6	Area of main road (B≥7 m)(km2)	6.7	6.12	3.31
7	Road area / Urban area (3/2)%	6%	2%	1%
8	Road width (B)			
8.1	- B<7m(%)	16.65	23.28	60.06
8.2	- 7m ≤B<10m(%)	54.7	34.49	10.81
8.3	- 10m ≤B<12m(%)	61.5	22.07	16.43
8.4	- B≥12m(%)	56.89	29.68	13.43
9	Road type			
9.1	Urban road (%)	49.92%	44.52%	5.56%
9.2	National highway (%)	0.00%	26.12%	73.88%
9.3	Provincial road (%)	0.00%	0.00%	100%
9.4	Rural district road (%)	0.00%	0.00%	100%
9.5	Town road (%)	0.00%	0.00%	100%
9.6	Others (%)	0.00%	96.96%	3.04%
10	Traffic signaled intersection	479	159	104

Source: HCMC Department of transport, 2013

3. Analysis results of traffic accident data and video recording at 15 school gates and 10 typical routes

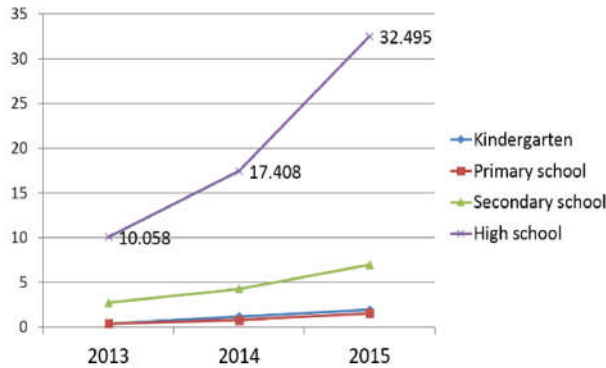
3.1 Remarkable general characteristics

In the period 2010-2015, traffic accidents in general in Ho Chi Minh City tended to decrease across all three categories (number of traffic accidents, number of deaths and number of injuries). But in the period 2013-2015, traffic accidents related to children tend to increase rapidly, for example the number of children killed and injured by traffic accidents increased by 217% and 260 % (Table 2). Calculating road traffic fatality rates for over 100,000 children in different age groups shows that children in high school are the most vulnerable, with a mortality rate of 32.5 (Figure 3), 04 times higher than the rate of road traffic fatalities among adults in HCMC and 8-9 times higher among children in the same age group in developed countries (Table 3).

Table 2 Traffic accident data in HCMC, 2010-2015

Year	Total accidents	Total deaths	Total injuries	Child accidents	Child deaths	Child injuries
2010	1101	837	432	n.a	n.a	n.a
2011	1042	887	495	n.a	n.a	n.a
2012	958	824	388	n.a	n.a	n.a
2013	941	775	349	36	35	15
2014	850	701	322	85	61	55
2015*	771	692	268	104	111	54
Total 2013-2015	2562	2168	939	225	207	124
				8.8%	9.5%	13.2%

Source: HCMC Department of traffic police (PC67), (2015)



Source: HCMC Department of traffic police (PC67), (2015)

Fig.3 Mortality rate by road traffic accident of children in HCMC

Table 3 Rate of fatality per 100.000 people of high school student, 2014

Country	HCMC	Italy	Greece	Belgium
Rate	32.495	3.05	4.55	3.35

Source: WHO - Global status report on road safety 2015

Analysis shows that children in high school are involved in more than 70% of total traffic accidents related to children in HCMC, followed by children in secondary school (nearly 20%) and children are in primary school (5%) and children are in kindergarten (5%) (Figure 4). Boys are more vulnerable than girls, with more than 85% of all child traffic incidents, with girls involved only 15% (Figure 5).

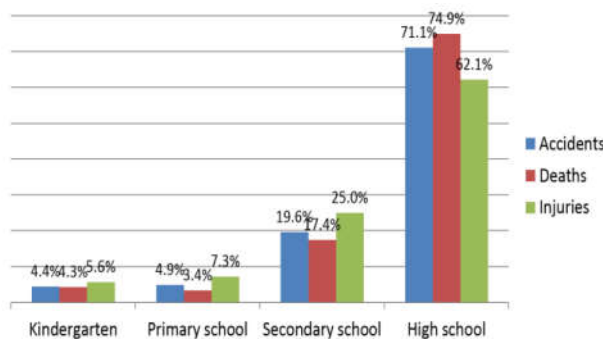


Fig.4 Child-related traffic accident rate by grade

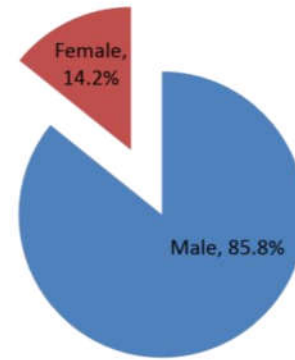


Fig.5 Child-related traffic accident rate by sex

In fact, there are about 80% of traffic accidents involving children between the ages of 13 and 18 occurring when they are riding; Only 20% of cases occur when parents are occupants and children are pillion passengers. In particular, in traffic accidents related to children under 06 years old, the occupant is over age 19, that mean parents who transport their children to school in this case. In traffic accidents of secondary school children, occupants are mainly aged 12-15, meaning they riding by themselves or riding with their classmates then make traffic accidents. In traffic accidents of high school children, occupants are in the 16-18 age group, this means that children are riding when an accident occurs. Therefore, to significantly reduce the number of traffic accidents involving children, the city government needs to focus on groups of children, especially children in high school.

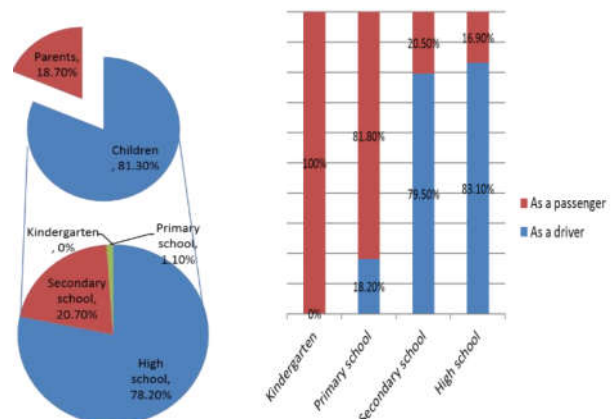


Fig.6 The rate of children-related traffic accident by different traffic participating groups

3.2 Traffic accident characteristics related to children

3.2.1 Traffic accidents distribution by time

Statistics show that child-related traffic accidents occur after school hours and private lessons hours, traffic accidents involving secondary school students occur between 10am and 2pm, traffic accidents involving high school students occur between 6pm and 2am of the following day. Traffic accidents increase over the weekend, traffic accidents involving secondary school students tend to increase on Thursday. May, June, July are the summer months of the year, traffic accidents related to children tends to increase.

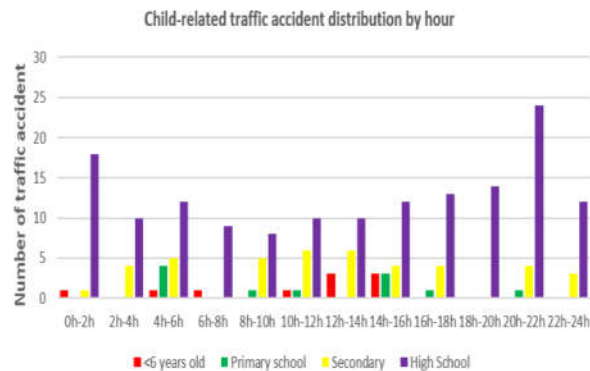


Fig.7 Child-related traffic accident distribution by hour

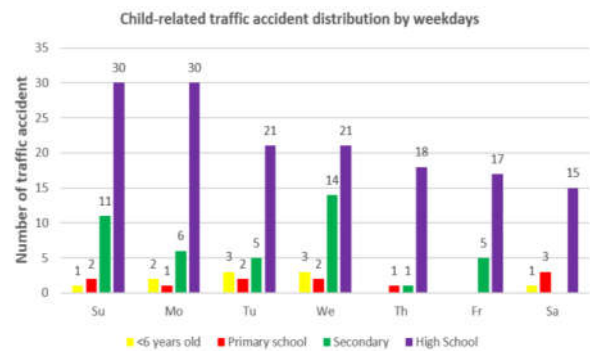


Fig.8 Child-related traffic accident distribution by weekdays

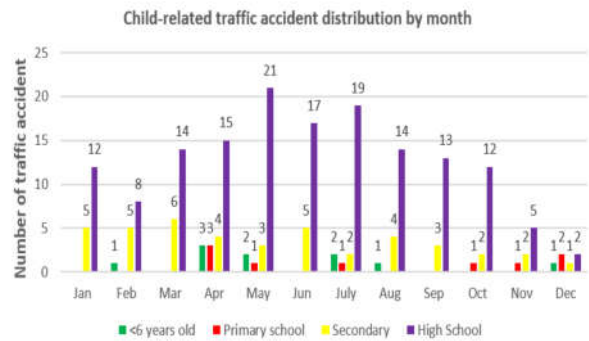


Fig.9 Child-related traffic accident distribution by months

3.2.3 Traffic accident distribution by zone and location

Figures 10 and 11 shows that child-related traffic accidents occur 82% on roads, and 18% at intersections.

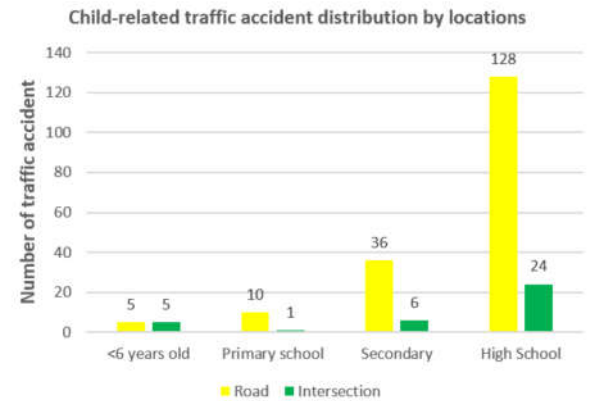


Fig.10 Child-related traffic accident distribution by locations

Traffic accidents have no difference in the number of cases between regions, in which secondary school (20%) and high school (71%) still make up a high proportion compared to other age groups.

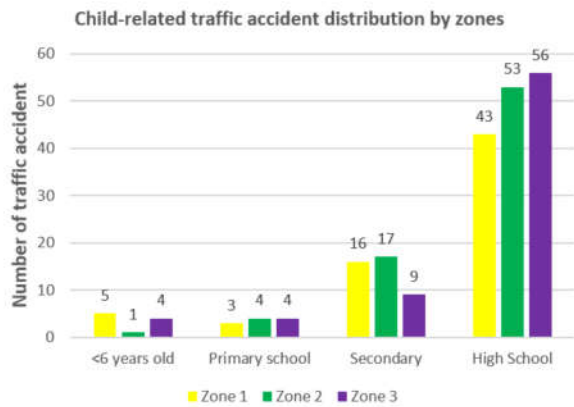


Fig.11 Child-related traffic accident distribution by areas

3.2.3 Child-related traffic accident distribution by main accident causes

By analyzing data from 225 child-related traffic accidents occurring in the period 2013-2015, there are five main causes of traffic accidents related to children: Wrong-way driving; Incorrect turning of vehicle; Driving/riding over the speed limit; Illegal overtaking; Going the wrong place when crossing the road.

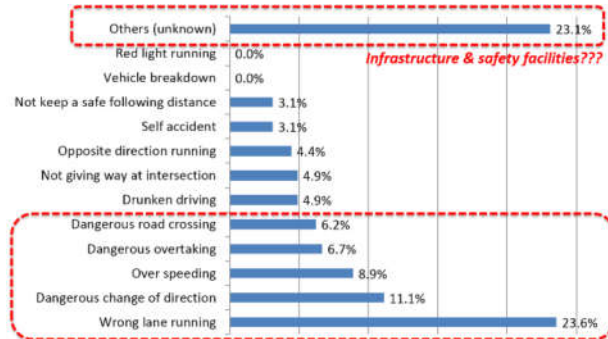


Fig.12 Traffic accident causes related to children

3.3 The result of analysis video data on traffic participating of children and parents

The research team collected 6,800 observation camera samples at 15 school gates and 10 typical routes in Ho Chi Minh City. The results show that the rate of walking and cycling to primary school is very little (16.6% walking and 2.1% cycling), while schools are very close to home. Only 4-6% of secondary and high school children go to

school with bicycles/electric scooters, and mostly self-driven. More than 10% of high school students ride motorbikes (over 50cc) to school illegally. More specifically, more than 50% of children go to school by motorbike, of which more than 20% drive themselves when they are under 18 (age allowed driving/riding in Vietnam) (Figure 13).

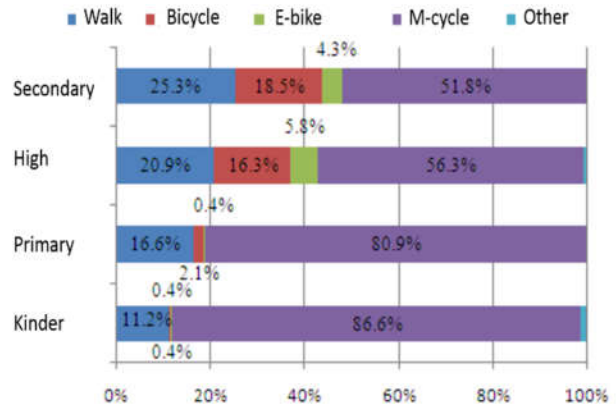
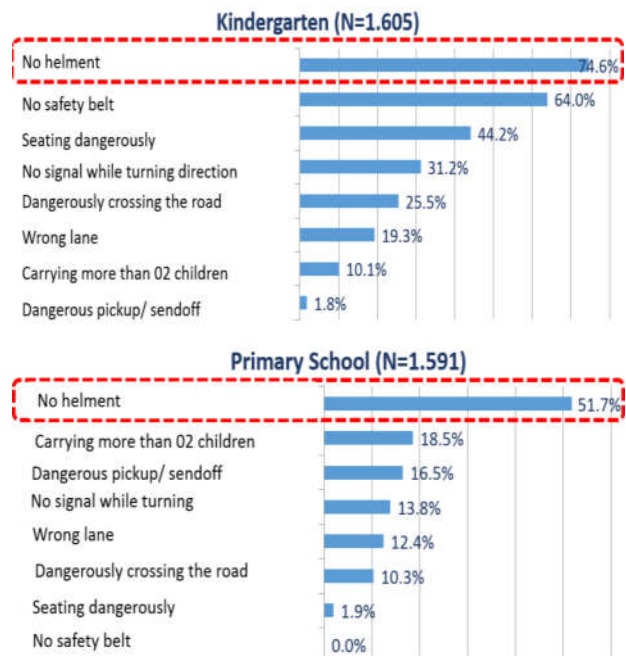


Fig.13 The mode used to go to school

The percentage of students who do not wear helmets when going to school is very high. Specifically, the rate of non-wearing helmet at all levels: is nearly 75% of kindergarten, primary school student is over 50%, secondary school student is over 35% and high school student is above 15% (Figure 14).



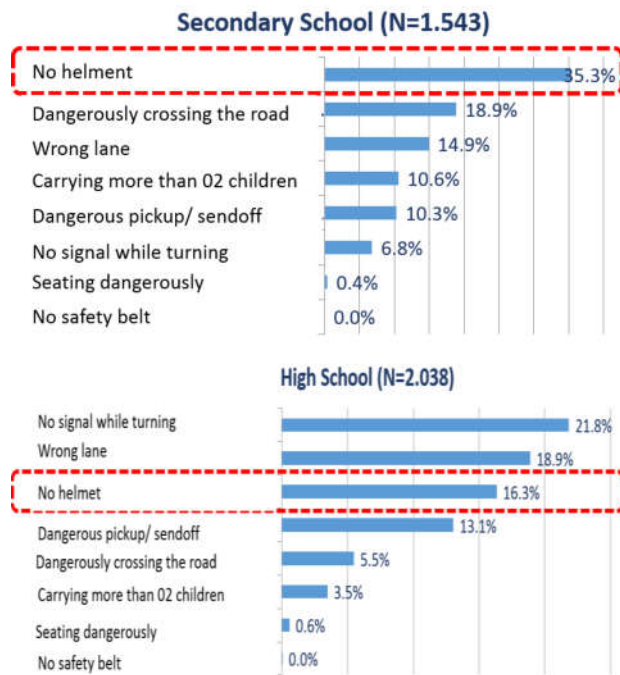


Fig.14 Percentage of students violating traffic safety regulations when going to school

3.4 Summary of analysis results

From the results of the analysis, the article summarizes the striking characteristics of traffic accident and the sense of observance of regulations on traffic safety in children and related subjects (parents) in HCMC as follows:

- + Traffic accidents for children account for nearly 9% of the total number of traffic accidents throughout Ho Chi Minh City and have been on the rise in recent years.
- + High school-aged children are the most vulnerable. This group has a mortality rate of 32.5 / 100,000 children, which is four times higher than the average mortality rate of the city population, and 8-9 times higher than children of the same age in developed countries.
- + Secondary school children are involved in more than 70% of total traffic accidents involving children in the city, followed by children in secondary school age (nearly 20%) and primary school children (5%) and kindergarteners (5%).
- + Boys are more vulnerable than girls. In fact, boys are involved in 85% of traffic accidents involving children, while girls are only 15%.
- + In fact, there are about 80% of child-related traffic accidents occurring when children themselves are in control (especially in the 13-18 age group), with only 20% of cases occurring

when an adult or parents is riding a motorcycle with child passenger behind. The future traffic safety improvement program should focus on this target group to dramatically reduce traffic accidents involving children.

- + There are five leading causes of traffic accidents involving children: (1) wrong-way driving, (2) incorrect turning of vehicle, (3) driving/riding over the speed limit, (4) Illegal overtaking, (5) going the wrong place when crossing the road.
- + The rate of walking and biking to school of primary school children is very low (17% on foot and only 2% on bicycles), while almost schools are very close to their home.
- + More than 10% of high school students' self-drive motorcycles over 50cc to school illegally.
- + The rate of non-wearing of helmets in children is very high: kindergarten children is 75%, primary school student is over 50%, secondary school student is 35%, and high school student is over 15%.

4. Conclusion and recommendation

The analysis results show that there is a large difference in the types and causes of traffic accidents, the rate of traffic violation among groups of children differentiated by age and sex. High school and secondary school students are involved in more than 90% of child traffic accidents. This is also a group of children with a high rate of self-control of vehicles when participating in traffic. In order to improve traffic safety for children, especially high school students, in addition to continuing to implement solutions already applied in the country, the HCMC authorities should study the experiences and solutions that have successfully applied in other countries around the world.

From the results of the analysis in this article, the study proposes 03 groups of breakthrough solutions to improve traffic safety for children for HCMC and another provinces reference:

(1) Amend the traffic law, strengthen surveillance patrols to dramatically reduce traffic safety violations in children and parents.

It is necessary to strengthen the patrol, supervision and punishment of children driving motorcycles, not wearing helmets, speeding over, riding in the wrong way, wrong lane. At the same time, the government should consider amending the road traffic law so that helmets may be required for 3-5-year old.

(2) Promote culture of walking and cycling for children, especially primary and secondary school students

To do that, it is necessary to reestablish the pavement order, to renovate the sidewalk pavement. Study and build bicycle lanes so that children can ride bicycles safely and comfortably to school.

(3) Implementing the School Zone Safety Project

According to the experience of many countries (Japan, Korea, Singapore and other European countries), in order to successfully implement the safe school project, it is necessary to set up the traffic safety board at the school level headed by the headmaster. This committee is responsible for coordinating with the traffic police and local authorities to divide the entrance, reorganize the sidewalks, design the waiting areas and pick up children in the different grades; arrange safety equipment (signboards, paint lines, decks, ...); arrange staff to regulate and supervise traffic order and safety in the area of school gates; and arranges bus routes for students while enhancing public transport services that connect to schools.

In addition, in order to improve the sense of compliance with traffic rules, safe traffic participation regulations for children and their parents need to be renewed the IEC activities to improve the sense on traffic safety for children and parents.

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