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Analysis of Child-related Road Traffic Accidents in Vietnam

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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 observations of road traffic law violations at 15 typical school gates and 10 typical roads. The results could be useful for the city government to formulate solutions to effectively improve traffic safety for children in Ho Chi Minh City and other cities in Vietnam.

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

1. Introduction

According to WHO, there were globally more than 186,000 children (aged under 18) died due to road traffic accidents every year (equivalent to more than 500 child deaths per day) [8]. In Vietnam, this figure was close to 2,000 children died because of traffic accidents per year, or equivalent to 5 children died per day [5]. In which, the proportion of child deaths who walked alone accounted for 36% and who rode a bike or a motorcycle accounted for about 20%. In the number of nearly 2,000 child deaths, nearly half of them had head injuries mainly due to the fact that they did not wear helmets. Vietnam's Ministry of Health reported that child traffic accident fatality rate of Vietnam was about 20 deaths per 100,000 children, while the figure was 7.4 deaths per 100,000 children in South East Asia and 4.2 deaths per 100,000 children in Europe [6]. It can be stated clearly that Vietnamese children are at the high risk of fatality when they participate in traffic.

There is a lack of in-depth and systematic studies on patterns and causes of traffic accidents involving Vietnamese children to support formulation of effective solutions to improving children road safety in urban areas. Up to now, there have been a few studies on traffic accidents involving Vietnamese children. The Ministry of Health published a traffic accident report by analyzing accident statistics from hospitals [6]. La Ngoc Quang investigated the status of helmet use by road users in six provinces of Vietnam, including Ho Chi Minh City [5]. Nguyen Thuy Quynh analyzed the relationship between helmet use and traumatic brain injury and the influences of personal and family factors on children's helmet use in Viet Nam [7].



This paper is to present key results of an in-depth analysis of children-related traffic accident data in urban areas. Accident patterns and causes are analyzed against a number of key factors, such as accident occurrence time, location, involved vehicle type, rider age, and rider gender. It is also aimed to capture the current situation of traffic law violations by pupils and their parents. Based on the results, the paper suggests some breakthrough solutions to improve traffic safety for children in Vietnamese cities.

2. Methodology and Data Collection

Figure 1 shows the analytical framework within this paper. To capture the trends and patterns of traffic accidents involving children, this study uses detailed traffic accident data collected from Ho Chi Minh City's Traffic Police Department (TPD) for a period of 6 years (2010-2015). To assess the situation and characteristics of traffic violations by children and their parents, video camera observations are conducted at 15 school gates and 10 typical roads in HCMC. To recommend children safety improvement solutions, the study reviews international and domestic experience in traffic safety policies for children.

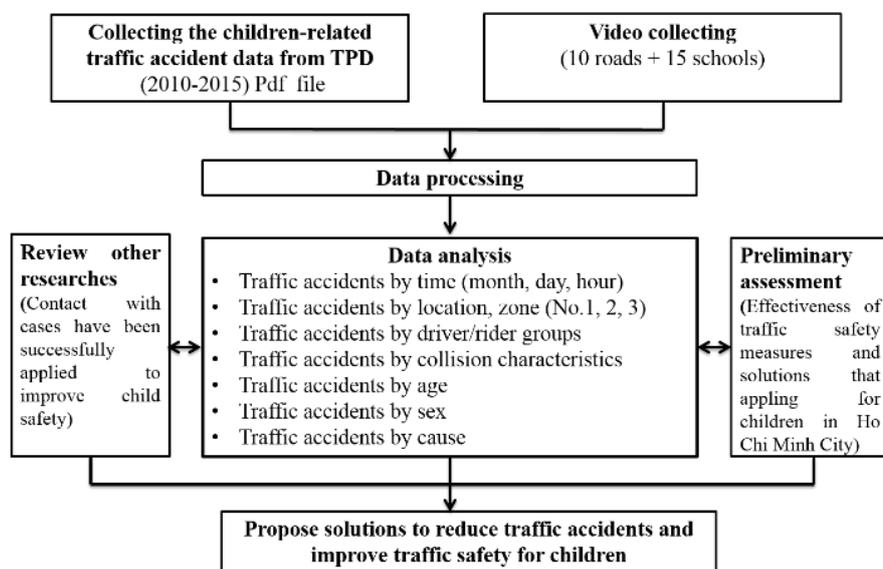


Figure 1. Analytical framework

3. Analysis of child-related traffic accident data

The data of 225 child-related traffic accidents occurred during the period 2013-2015 is analyzed and the key results are presented below.

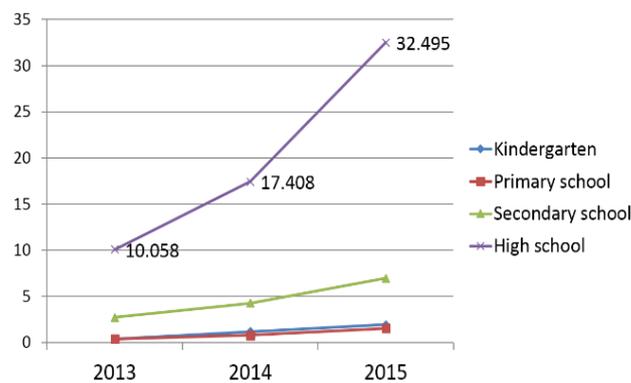
3.1 General characteristics and contrasting trends

In the recent years, the data shows that despite of the fact that traffic accidents in HCMC had been improving in terms of the number of accidents, deaths and injuries, the accidents involving children had been worsening. For the period 2013-2015, the numbers of children killed and injured by traffic accidents increased by 217% and 260 % (Table 1). In term of the fatality rate, high school aged children are the most vulnerable group, with the fatality rate of 32.5 deaths per 100,000 children (Figure 2). It is about four times higher than the fatality rate of general road users in HCMC and 8 to 9 times higher than the children of the same age in developed countries, such as 3.05 in Italy, 3.55 in Belgium, and 4.55 in Greece [8].

Table 1. Traffic accidents 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)

Figure 2. Fatality rate trends for children groups in HCMC

High school aged children involved in more than 70% of the total children traffic accidents in HCMC, followed by secondary school aged children (nearly 20%), and primary school aged ones (5%) and kindergarten children (5%) (Figure 3). Boys were more vulnerable than girls, being involved in more than 85% of the total children traffic incidents while girls involved in only 15% (Figure 4).

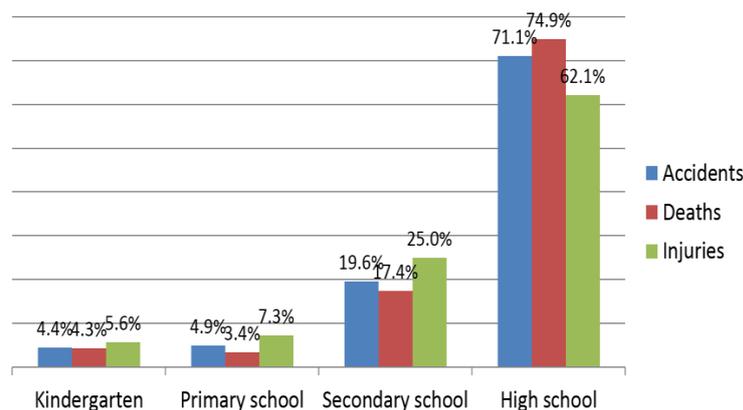


Figure 3. Children traffic accident, death, and injury distributions by age group

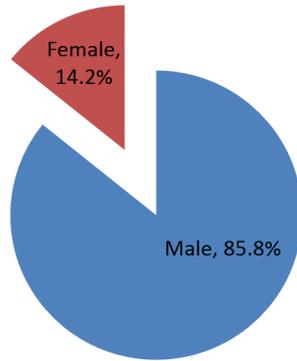


Figure 4. Children traffic accident distribution by gender

About 81.3% of the total children traffic accidents happened the children were driving, only 18.7% of the accidents occurred while the parents were driving and carrying their children. A look into accident distribution by child age group shows that all the kindergarten child related accidents happened while the parents or some adults were driving to carry them. Surprisingly, there was still 18.2% of the primary school aged child accidents occurring while the children were driving a bicycle or an e-bike. In contrast, about 80% of the accidents involving secondary and high school aged children happened while the children were driving a vehicle, either a bicycle, an e-bike or even a normal motorcycle despite of being illegal. To significantly reduce the number of traffic accidents involving children, the local government should focus their actions on the children at high and primary school age.

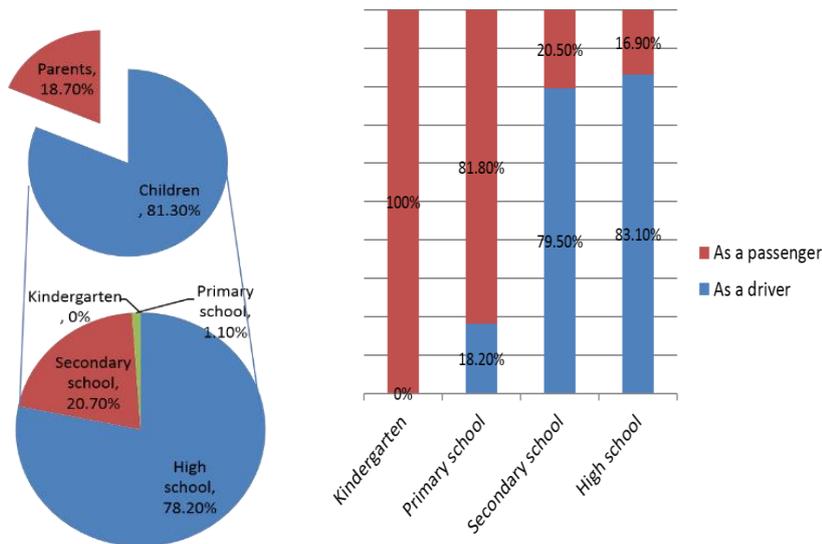


Figure 5. Percentages of children traffic accidents happening while they were a driver

3.2 Distribution characteristics of the child traffic accidents

Time distribution of the traffic accidents

During a day, more accidents occurred after the school hours. For examples, secondary school aged children tended to occur the period 11:00 am – 2:00 pm, the ones involving high school children were

likely to occur after 6:00 pm. During a week, the accidents tended to increase at weekends. During a year, the accidents tended to happen during summer months (May – July).

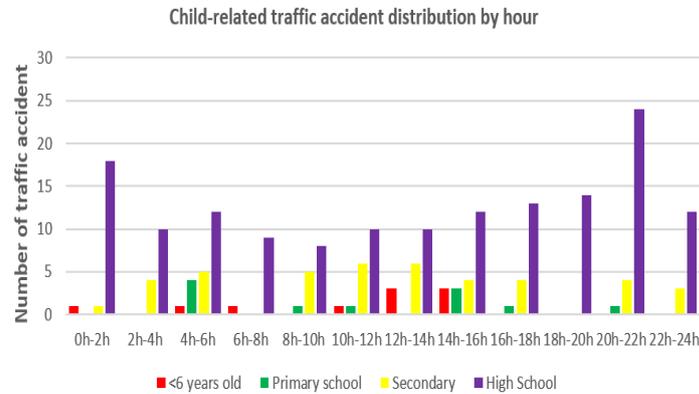


Figure 6. Child-related traffic accident distribution by hour of the day

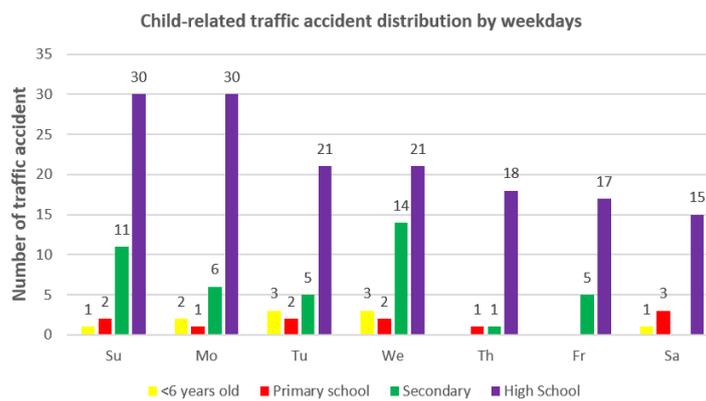


Figure 7. Child-related traffic accident distribution by day of the week

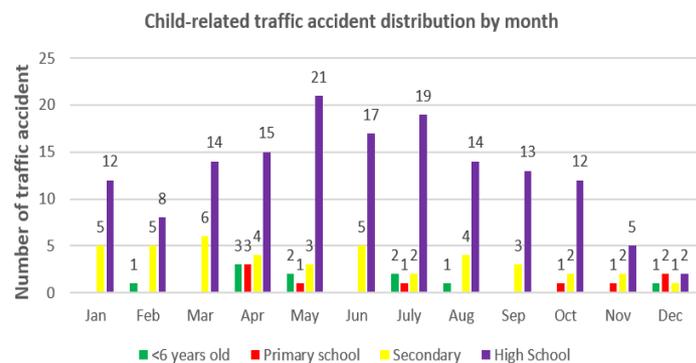


Figure 8. Child-related traffic accident distribution by month of the year

Location distribution of the accidents

The majority of the child-related traffic accidents occurred road sections (82%) and the rest occurred at intersections, including both signalized and non-signalized ones.

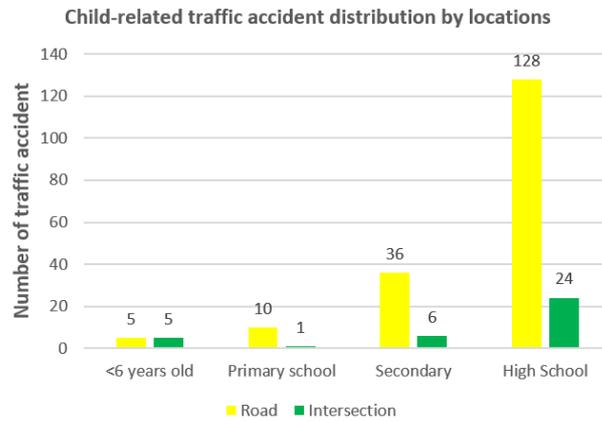


Figure 9. Child-related traffic accident distribution by location

Main cause distribution of the accidents

There were five main causes of the traffic accidents, including: (1) Wrong lane running (23.6%); (2) Dangerous change of direction (11.1%); (3) Speeding (8.9%); (4) Dangerous overtaking (6.7%); (5) Crossing road dangerously (6.2%). Interestingly, unknown cause accidents accounted for 23.1% and improper road infrastructure conditions and safety facilities may contribute largely to this.

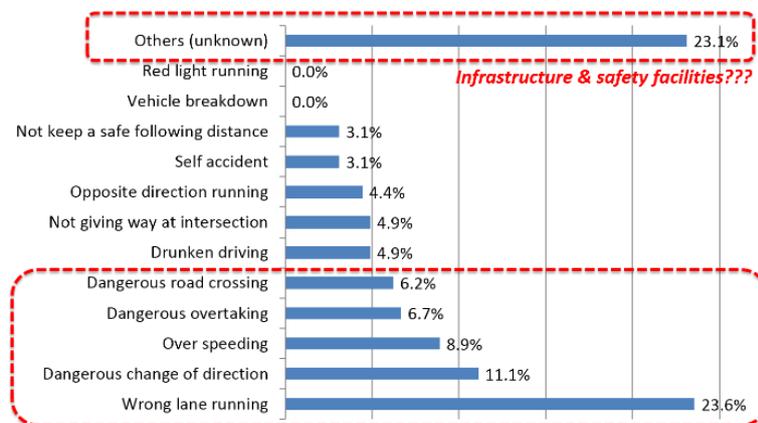


Figure 10. Child-related traffic accident distribution by main cause

4. Analysis of video based observation data

The study conducted a video based observation on traffic participation behaviors of the children and their parents at 15 school gates and on 10 typical roads in the city. Totally, 6,800 samples were collected for the analysis. Key results are shown below.

Modes used to school

For primary school children, walking and cycling to schools were very little (16.6% walking and 2.1% cycling) despite of the fact that primary schools are often located within walkable distances from home. For secondary and high school children, only about 5% of them went to school by bicycle or e-bike, which were mostly self-driven. More than half of them went to school by motorcycle, in which about one fifth illegally drove a motorcycle of more than 50cc to school (Figure 11).

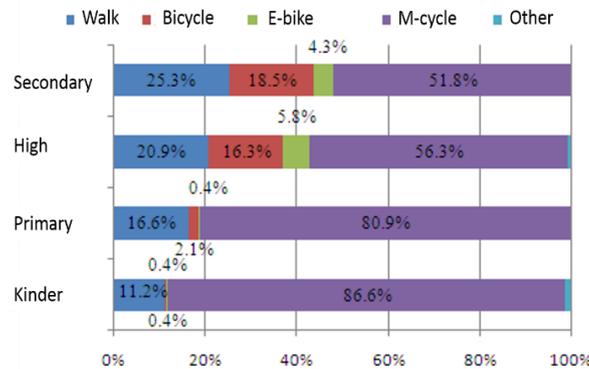
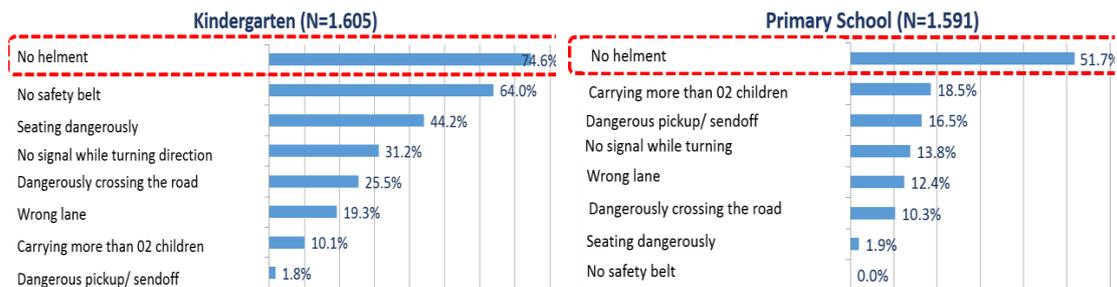


Figure 11. Distributions of transport modes used to go to school

Traffic law violations of the parents and children

The observations show the very high percentage of the children going to school without wearing a helmet. The figures were nearly 75% in the kindergarten children, more than 50% in primary school pupils, more than 35% in secondary school children, and over 15% in high school students (Figure 12).

For kindergarten children, the top violations are no helmet, no safety belt, seating dangerously, no signal while turning, and wrong lane running. For primary school children, the top violations are no helmet, carrying more than 2 children by motorcycle, dangerous pick-up/send-off, no signal while turning, wrong lane running. For secondary school children, the top violations are no helmet, dangerous road crossing, wrong lane running, carrying more than two children, dangerous pick-up/send-off. For high school children, the top violations are no signal while turning, wrong lane running, no helmet, dangerous pick-up/send-off, and dangerous road crossing.



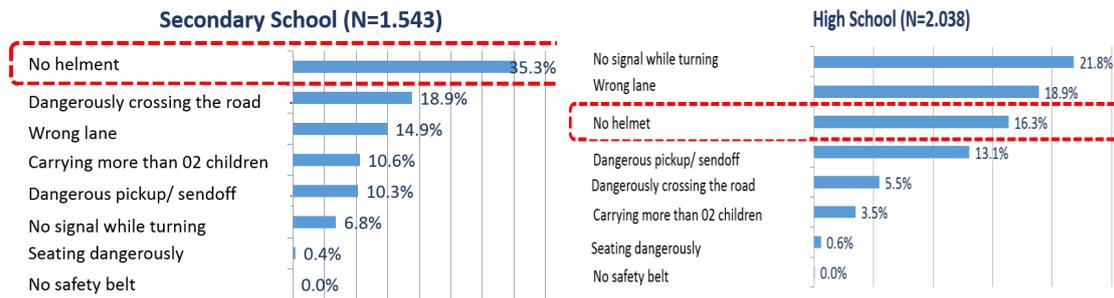


Figure 12. Percentage of students violating traffic safety regulations when going to school

5. Conclusions and recommendations

Specific key findings from the analysis and its policy implications are summarized as follows. First, while traffic accidents are generally decreasing, but child-related accidents are increasing, thus needs to be addressed carefully. Second, high school aged children are the most vulnerable group and thus need to be prioritized in traffic safety improvement actions plan. Third, as boys are much more vulnerable than girls and more than 80% of the accidents happened when the children were driving, thus more specific interventions should be advised for male children. Fourth, five leading causes of child-related traffic accidents are wrong lane running, illegal turning, speeding, illegal overtaking, and illegal road crossing. Educational, enforcement, and engineering measures should be formulated to specifically address such violations among the parents and children. Fifth, because the percentages of primary school children walking and bicycling to school are very low, actions must be taken to introduce safe routes to school in order to encourage walking and bicycling among the children. Sixth, more than 10% of high school students still drive a motorcycle over 50cc to school. This is illegal and thus needs to be enforced strictly by traffic police and school management. Seventh, the rate of no helmet wearing in children is very high, awareness and campaign programs should be continued and strengthened at schools and kindergartens. Last, as child-related accidents are likely to happen more after school hours, at weekends, and during summer months, programs and actions should be focused on such aspects. Traffic safety programs should be extended to households and other education centers other than schools and kindergartens.

Among the recommended actions based on the study results, the priority shall be given to three breakthrough solutions to improve road traffic safety for children in Vietnamese cities. First, it is important to amend the road traffic law and strengthen surveillance patrols to dramatically reduce traffic safety violations in children and parents. It should target at children driving a motorcycle, not wearing helmet, over speeding, and running in the wrong lane. The central government should consider amending the road traffic law so that helmets will be required for children of 3-5 years old. Second, it is necessary to promote culture of walking and cycling for children, especially primary and secondary school ones. To do that, it is critical to improve sidewalk pavement quality and set order on it, and build bicycle lanes so that children can ride bicycles safely and comfortably to schools. Last, it is right timing for implementing School Zone Safety Projects. Japan, Korea, Singapore and other European countries successfully implemented safe school projects, Vietnam can replicate such a program by setting up Traffic Safety Committee at school level headed by school principal. This committee is responsible for coordinating with traffic police and local authorities to re-organize school gate/entrance and nearby sidewalks, design waiting areas for pickup/sendoff, arrange safety equipment (such as signboards, paint lines, decks, etc.), arrange staff to regulate and supervise traffic order and safety in the area of school gates, and plan to provide school bus routes for students while the city is enhancing public transport services that connect to schools.

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