

ACCIDENT AMONG CHILDREN IN INDONESIA URBAN AREAS

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Abstract

Road crash fatalities in Indonesia are substantially high with around 30,000 deaths annually, in which 12 percent of them were children age below 15 years old. They are not only just a victim, but also 13 percent of them were a preparatory of accidents because of the underage motorcycle riders and community ignorance. The safety of children younger than 15 years in low and middle income countries receives substantial attention from road safety advocates activist in Indonesia. The study objectives are to highlight the magnitude of the problem in particularly associated to motorcycle and pedestrian accidents among the children in five metropolitan cities with highest number of accidents and then adjusting to the population cohort structure to find whether there a substantial exposure problem compare to the adult. The finding will be important for advocates' road safety program to the children in Indonesia.

Keywords: road safety, road traffic accident, children casualties, children fatalities

Abstrak

Korban kecelakaan jalan di Indonesia dilaporkan berada pada jumlah yang tinggi, yaitu sekitar 30.000 kematian setiap tahunnya, dengan 12% merupakan korban anak-anak berusia di bawah 15 tahun. Namun, mereka bukan saja sebagai korban, tapi juga pelaku kecelakaan (13%) yang disebabkan oleh penggunaan motor di bawah umur (tanpa SIM) dan ketidakpedulian masyarakat atas permasalahan ini. Keselamatan anak-anak di bawah 15 tahun di negara berkembang mendapat perhatian dari aktivis pendukung keselamatan jalan di Indonesia. Tujuan penelitian ini adalah untuk menyoroti masalah kecelakaan yang melibatkan anak-anak di bawah 15 tahun, terutama yang terkait dengan kecelakaan sepeda motor dan pejalan kaki di lima kota metropolitan dengan jumlah kecelakaan tertinggi di Indonesia, yang kemudian disesuaikan dengan struktur kelompok populasi untuk mengetahui apakah ada masalah perbandingan yang substansial dengan orang dewasa. Temuan ini akan menjadi masukan yang berharga bagi para perancang program keselamatan jalan bagi anak-anak di Indonesia.

Kata-kata kunci: keselamatan jalan, kecelakaan lalulintas, korban anak-anak, korban meninggal anak-anak

INTRODUCTION

About 1.3 million people died every year due to traffic collisions. More than 25 million people suffer from permanent disability. This trend worsened in most countries in the world as more and more people have motorcycles and cars. However, the trend improved in most western countries after the road safety program actively implemented over the last 50 years. Collision on the road is forecast to be the fifth leading cause of death worldwide by 2030 (WHO, 2009). The cost of road crashes care for people estimated to be around 2% of gross income (GDP) of a country. In Indonesia, all that is known at this time, the cost of road crashes was 2.9% of GDP. In countries with the development of

motorization that fast as Southeast Asia, Africa, South Asia, and South America, it was found that often the cost of collision is higher than the international aid received. As a result, more death due to road crashes will occur and a third of the road crash death toll will be the vulnerable road users, including children, pedestrians and cyclists (Watkins and Sridhar, 2009).

Indonesia's Road Traffic Accident (RTA) Data

In developed countries, the number of deaths from road crashes decreased sharply, about 10% over the last two decades (Ruger, 2005). However, in most developing countries, including Indonesia, the situation is getting worse. Without precautions, the number increased significantly. In addition, there is a very noticeable difference in any way affected road users to road crashes. More than half of the deaths from road crashes involved young adults aged between 15 and 44 years. While in the world, 73% of all deaths are men, in Indonesia, this figure is higher, and almost 90% of deaths due to road crashes are male. User vulnerable road, pedestrians, cyclists and motorbikes, noting the proportion of traffic collisions are greater in low and middle-income countries than in developed countries.

Children Casualties as Important Issue in Indonesian Road Safety

Children casualties has been one of highlighted issue by WHO and many developed countries, however, in several developing countries, RTA involving children often neglected because of its low percentage, compared with other issues such as RTA involving MTW or HGV. Recent study by Bhalla and Mohan (2015) even stated that the exposure of children to MTWs is lower than people perceive because humans tend to remember unusually risky events and hence overestimate their prevalence. Besides lower number of accidents, they also stated that MTWs carrying child passengers have lower risk of crash involvement because drivers tend to ride at lower speeds.

In fact, despite the lower number of accidents, children accident rates in Indonesia showed serious issue. The number of accident occurred was not as high as other casualties, therefore rates are able to emphasize the important issue. Figure 1 showed accident rates comparison between children age 0-14 years old and adults over 15 years old using RTA data from IIRSMS 2013-2015. It is clearly seen that children accident rates shared almost half of adults' accident rates and it was similarly occurred in each year from 2013 up to 2015. It can be said that from three casualties, one of them involved children age 0-14 years old.

The other fact about children casualty in Indonesia is almost half of MTW casualties involved children as its perpetrator (see Figure 2). It is clear that the children perpetrator did not have any license to ride the MTW. It is common seeing MTW used by the boys (or girls) under 15 years old without realizing the road accident risk. People slowly forget that motorized vehicle could lead them into unwanted incident, or even worse, lead other road users into fatal accident. Based on Indonesian Traffic Law UU No 22/2009, people under 17 years old forbid to drive or to ride any motorized vehicle.

Moreover, in UK, young driver under 25 years old should hold insurance because they believe young drivers have strong relationship with high-risk driving behavior. It means Government of Indonesia (GoI) and other related stakeholders should take this issue into account, especially through law enforcement.

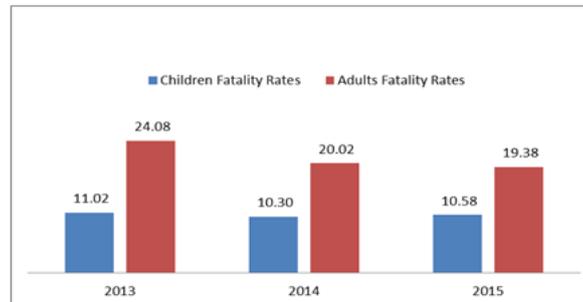


Figure 1 Children Accident Rates Compared with Adults Accident Rates in Indonesia

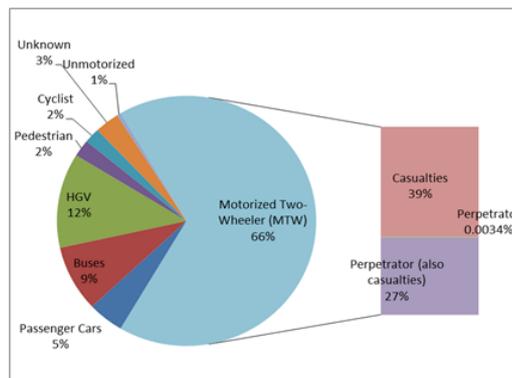


Figure 2 Prepertrator and Casualties Portion Among Children in Indonesia (2013-2015)

To support two important facts before, Figure 3 showed children accident data trend from 1 January 2013 until 31 December 2015. Based on Ahmad et al. (2001), the age classification was divided into three groups: 0-4 years old, 5-9 years old, and 10-14 years old. This classification is also used by WHO. The oldest group shared the largest percentage number of casualties, with most of them were slightly injured. Each age classification showed similar proportion among fatal, serious and slightly injured in each year and the number of casualties were slowly reduced in 2015, except for group 5-9 years old. In 2015, the number of children age 5-9 years old with slightly injured was around 500 children higher than number of casualties in 2014. However, it can be interpreted as good sign, as the quality of accident data recording is improved, so it is not only fatality data was recorded, but also the slight casualties.

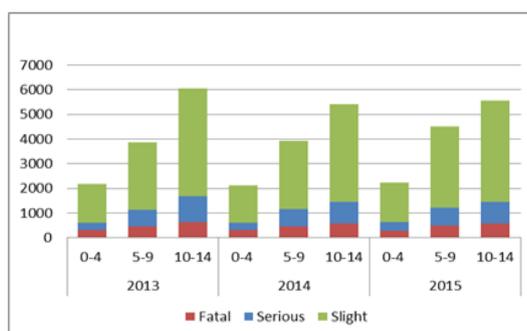


Figure 3 Children Severity Caused by Road Accident in Indonesia (Age 0-14)

OBJECTIVES AND LIMITATION

This study aims to provide Road Traffic Accident (RTA) pattern involving children age 0-14 years old in five metropolitan cities in Indonesia with the highest number of accidents in 2013-2015.

The objectives of this study are:

- 1) to highlight the magnitude of the problem in particularly associated to motorcycle and pedestrian accidents among the children;
- 2) to understand what the real cause of RTA involving children; and
- 3) to provide recommendation regarding road safety program to the children in Indonesia.

The limitations of this study are:

- 1) the data were analysed based on last three years (2013-2015) traffic accident data from Indonesian Integrated Road Safety Management System (IIRSMS);
- 2) further analysis only presented in 5 (five) metropolitan cities in Indonesia with the highest number of accidents involving children in 2013-2015.

DATA SOURCE AND METHODS

There are three main data that presented in this study. First is Road Traffic Accident (RTA) Data. The data was obtained from Indonesian Integrated Road Safety Management System (IIRSMS) from 1 January 2013 until 31 December 2015. All the accident data presented children casualties from age 0-14 years old with age classification 0-4, 5-9, and 10-14. This age classification was grouped based on Ahmad et al. (2001), and this is a standard age classification applied in most of countries in the world. To collect and find metropolitan city with the highest number of children casualties, this study required RTA data involving children casualties from all regions in Indonesia.

The second important data is number of children population in Indonesia. This study used population data from each region (*kota/kabupaten*) in Indonesia. This

population was used for rates analysis for comparing purposes. The population data was obtained from Indonesian Statistic Center (BPS) and was taken in 2010. While the RTA data was taken in 2013-2015, the population data in 2013-2015 was calculated using provincial growth rates and each province might had different growth rates. We obtained these data from Indonesia Population Projection 2010-2035 by (BPS, 2013), a study funded by United Nations (UN).

The last data used in this study is number of vehicles in each region in Indonesia. This data was obtained from provincial authority depend on each region belong to. Most of them were taken from regional statistics by BPS. If the data obtained was not in 6range of 2013-2015, then we calculated the number of vehicles using vehicle's growth rates based on each province data trend. There are four vehicle classification used this study: passenger cars, buses, MTWs, and Heavy Goods Vehicles (HGV). All cars that accommodate people are categorized as passenger cars and that used for goods transportation belong to HGV.

Each region has different demographic. Some of the regions might have higher number of vehicles, which possibly lead into higher number of accidents and the other regions with lower population, might have high possibility to be involved in an accident. Therefore, rate is used to compare each data equally. There are several categories for calculating rate. Table 1 showed which categories that we used in this study.

Table 1 Rates Category used as Data Base in this Study

Rates Category	Numerator	Exposures	
		Denominator	Denominator Number
Accident Rates	Number of accidents	Number of population (in this study, we used children population aged from 0-14 years old).	100.000
		Number of vehicles, based on each vehicle type (passenger cars, buses, MTWs, HGVs).	10.000
Fatality Rates	Number of killed victims (fatalities)	Number of population (in this study, we used children population aged from 0-14 years old).	100.000
		Number of vehicles, based on each vehicle type (passenger cars, buses, MTWs, HGVs).	10.000

Compiled from Holló (2006) and WHO (2013)

Two categories of rate are used in this study. This category showed different meaning of RTA data. Accident rate showed rate based on number of accident, frequency of RTA in that region. The next category is Fatality Rate, which can be used to see which region has highest possibility to have fatalities. For example, Region A has highest fatality rates; therefore, if an accident happened in Region A, mostly the victim was killed. Meanwhile, denominator number is used to simplify the data, because it is easier to read number with fewer decimal places than number with a lot of zero decimal. Basically, we divided the denominator first with denominator number, then divide numerator with that calculation result (exposure). So, for example, the final result will be rates per 100.000 children population or rates per 10.000 MTWs.

To analysis the data obtained, we listed the RTA data, from 1 January 2013 until 31 December 2015, involving children age 0-14 years old based on regions. Then, we find five metropolitan cities with highest number of accident in Indonesia RTA data from every region were analysed further to find the interesting facts in particularly associated with type of vehicle, time of accident, type of accident, or other related information. The highlighted problems are used as based information for develop recommendations. Each city could be show different fact.

DATA RESULTS

First step in analyzing data is sorting RTA ranking around Indonesian regions. Based on this result, five metropolitan cities were chosen to be analyzed further. For the initial results, the 5 metropolitan cities, ranked from the lowest to the highest number of accident, are Bandung, Surabaya, Makassar, Semarang and Medan.

Table 2 Regionals Highest Ranking of Road Traffic Accident Data Involving Children Age 0-14 Years Old in Indonesia (2013-2015)

Rank	Regional	No. of Accidents	Rank	Regional	No. of Accidents
1	Medan Metropolitan City	4279	17	Jakarta Timur	2459
2	Sidoarjo	3581	18	Surabaya Metropolitan City	2431
3	Kediri	3292	19	Bekasi Kabupaten	2338
4	Sleman	3197	20	Banyuwangi	2323
5	Banyumas	3162	21	Pasuruan	2279
6	Tuban	3046	22	Sragen	2259
7	Jombang	3010	23	Cilacap	2236
8	Nganjuk	2974	24	Bandung Metropolitan City	2220
9	Bantul	2805	25	Demak	2164
10	Jember	2669	26	Lamongan	2132
11	Semarang Metropolitan City	2628	27	Tulungagung	2087
12	Sukoharjo	2595	28	Bojonegoro	2063
13	Indramayu	2550	29	Ditlantas Polda Metro	2058
14	Makassar Metropolitan City	2534	30	Jakarta Utara	1989
15	Klaten	2504	31	Grobogan	1959
16	Pati	2473	32	Boyolali	1930

Compiled from IIRSMS (2013-2015)

Comparison among Five Cities Based on Fatality Rates

Figure 4 showed the equal comparison among the five cities. Rates can be stated as equal comparison because it was divided per 100.000 children population because each city has different number of children. The ranking are almost similar, but we can see that even Surabaya has higher number of children accidents than Bandung, in fact, children in Surabaya might has lower possibility to be involved in road crash than in Bandung.

Comparison among Five Cities Based on Children Injury's Type

From Figure 5, using rates, the distribution of children severity can be compared equally. As can be seen, older children (10-14 years old) in all of the cities shared the highest rates. However, Makassar stand out alone, showing that its older children has the

highest severity rates which dominated by the slight injured children. It is simply to say that older children in Makassar faced more danger to be involved in road crash. Meanwhile, younger children (0-4 years old) in Bandung showed the lowest severity rates among other cities.

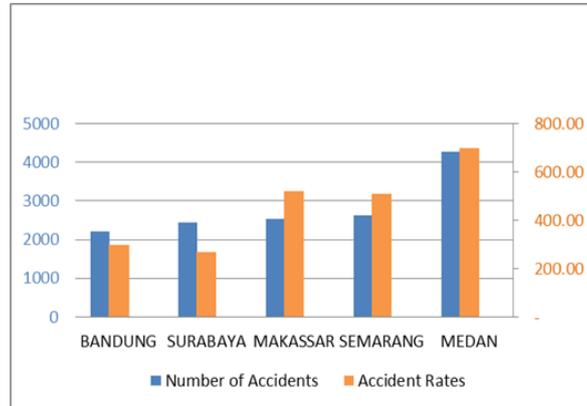


Figure 4 Number of Accidents and Accident Rates in Five Metropolitan Cities in 2015

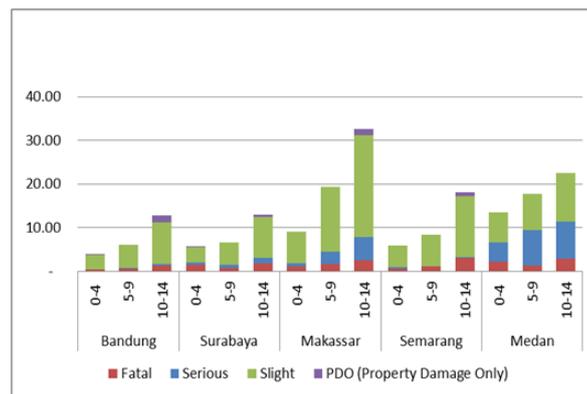


Figure 5 Children Severity Rate per 100,000 Populations in Five Metropolitan Cities

DISCUSSION AND RECOMMENDATION

Bandung Metropolitan City

By population, Greater Bandung is the third largest city in Indonesia. Based on data from the Indonesian Statistics Department, the population of Bandung in 2014 was 2,470,802. By 2010, the total number of children age 0-14 years old in Bandung were 600,144 people. Two third of them were in school-age and the rest were aged between 0-4 years old. With this large number of children, it is highly possible that Bandung turns into one of the most metropolitan city with highest number of children casualties. Table shows number of children casualties based on road users from 2013 until 2015 in Bandung. It can be seen that MTW (Motorized Two-Wheeled) and pedestrian is the main causes of children casualties in Bandung.

Table 3 Cross Tabulation between Road Users and Crash Type for Children Casualties in Bandung

Causes		Road Users				
		MTW	Car	Bus	HGV	Pedestrian
Pedestrian crash	without facility	2	-	-	-	63
	with facility	-	-	-	-	1
Single vehicle crash	without object	3	-	3	-	-
	with object	4	-	3	-	-
Crash between two vehicles or more	turning crash	38	-	3	-	-
	opposite direction	30	2	4	2	-
	in the same direction	76	3	5	1	-

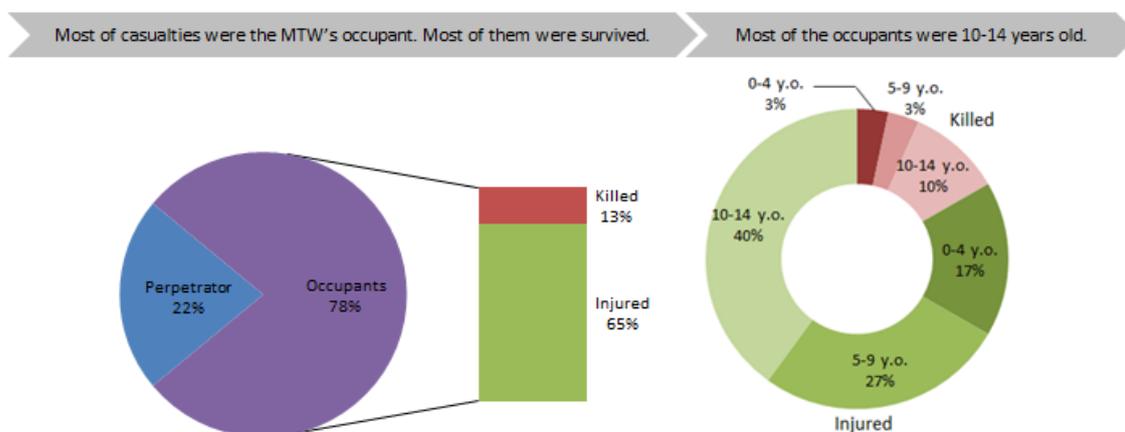


Figure 6 Chart for MTW Accident Involving Children in Bandung (2013-2015)

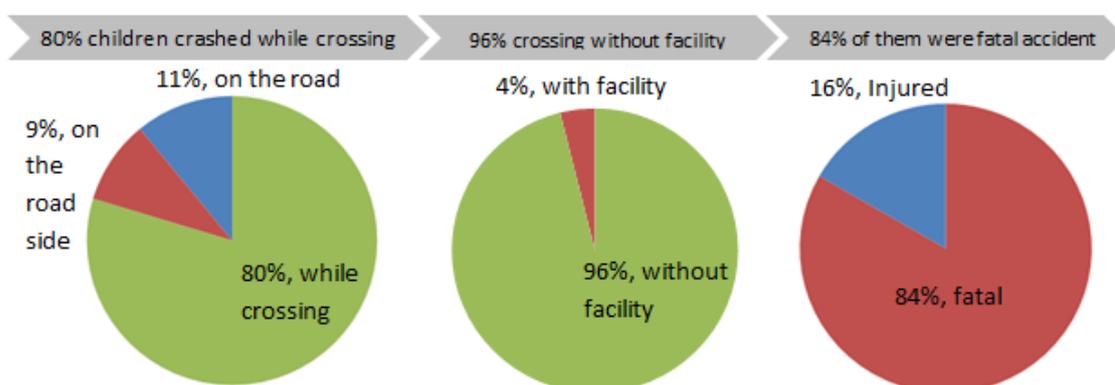


Figure 7 Chart for Young Pedestrian Casualties in Bandung (2013-2015)

Based on Figure 6, 22% of the MTW casualties were the perpetrators. As they were under 17 years old, riding the MTW was an illegal action. Even most of the casualties were survived; these underage riders have high possibility to lead into dangerous behaviour on the road.

Surabaya Metropolitan City

Surabaya, the capital of East Java, is the second-largest-city in Indonesia. Its ‘extended area’ called Gerbangkertosusila has around 9 million inhabitants spread along Gresik, Sidoarjo, Mojokerto and Pasuruan. Almost one third of those populations were children aged 0-14 years old. With around hundreds casualties involving children occurred in 2013-2015, Surabaya is a metropolitan city with the lowest accident rate in Indonesia. The summary of road crash is available on the following table.

Table 4 Cross Tabulation between Road Users and Crash Type for Children Casualties in Surabaya

Causes		Road Users				
		MTW	Car	Bus	HGV	Pedestrian
Pedestrian crash	without facility	6	-	-	-	29
	with facility	1	-	-	-	11
Single vehicle crash	without object	9	4	-	-	2
	with object	5	-	1	-	1
Crash between two vehicles or more	turning crash	20	-	1	-	-
	opposite direction	19	-	-	-	-
	in the same direction	73	3	1	-	-

Based on Figure 7, it is known that 6% of the casualties were a perpetrator of the accident whom was riding the motorcycle illegally. Furthermore, it is expected that students dominated the chart, because the older children were expected to be on the road more often than the rest. Meanwhile, crossing the road without facility is main reason young pedestrian casualties happened (Figure 8). But it is too early saying they were crossing illegally. The data should be compared with the crossing facilities in Surabaya in order to know it is because of lack of the crossing facility or the pedestrian behavior.

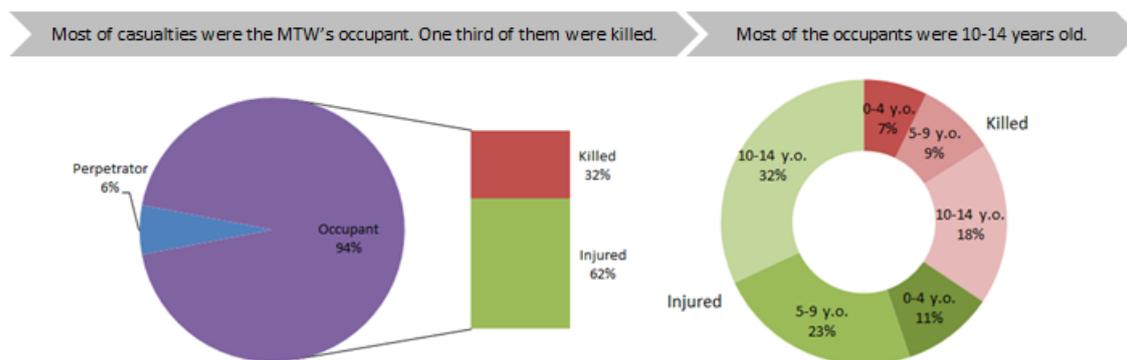


Figure 8 Chart for MTW Accident Involving Children in Surabaya (2013-2015)

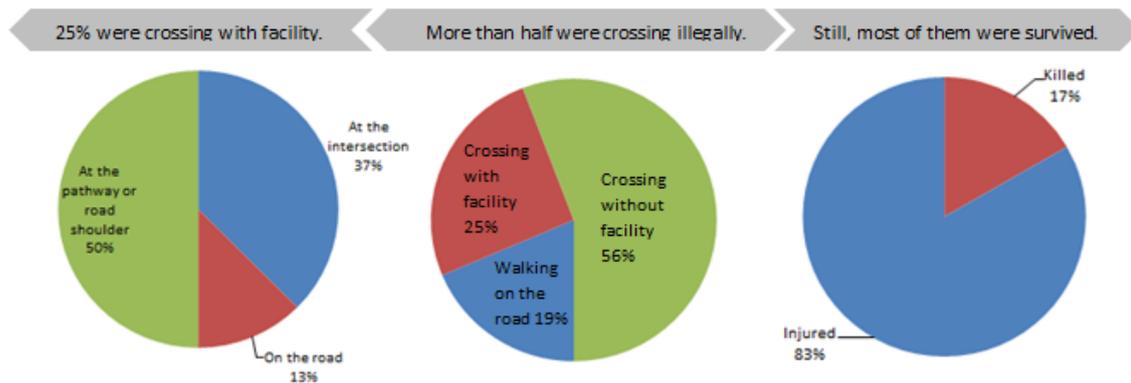


Figure 9 Chart for Young Pedestrian Casualties in Surabaya (2013-2015)

Table 5 Cross Tabulation between Road Users and Crash Type for Children Casualties in Makassar Year 2013-2015

Causes		Makassar				
		MTW	Car	Bus	HGV	Pedestrian
Pedestrian crash	without facility	13	-	-	-	133
	with facility	-	-	-	-	1
Single vehicle crash	without object	3	-	1	-	-
	with object	5	1	-	-	-
Crash between two vehicles or more	turning crash	53	-	-	-	-
	opposite direction	13	-	-	-	1
	in the same direction	-	-	-	-	-

Makassar Metropolitan City

Makassar is a port city on Sulawesi, one of five biggest islands in Indonesia. It is also known as Ujung Padang with its metropolitan area (Mamminasata) extends over 46 administrative *kecamatan* (districts), consisting of all 14 districts within the city, all 9 districts of Takalar Regency, 11 out of 18 districts of Gowa Regency and 12 out of 14 districts of Maros Regency. This official area covers 2,473 km² and had a population of 2,225,048 at the 2010 Census. Even the total number might not that high, but somehow; Makassar has the highest severity rate in for children age 10-14 in Indonesia. The summary of road crash is available on Table 5.

In Makassar's case, pedestrian crash was the highest number of children casualties. It can be seen on Table 5 that there were 133 young pedestrians crashed while crossing on the road. Figure 10 showed that they crossed the road illegally and road accident was the consequences: if you crossed illegally, your chance to be involved in road accident is higher. But, these data also show the lack of number of pedestrian crossing in Makassar. High number of pedestrian crashes also showed that Makassar needs more proper pedestrian facilities to reduce the number of pedestrian casualties, especially the young pedestrian. Meanwhile, MTW's accident involving children is also a serious problem in Makassar. It shared the second highest number of children casualties in Makassar. Moreover, some of them were young perpetrator who led the other children into road accident.

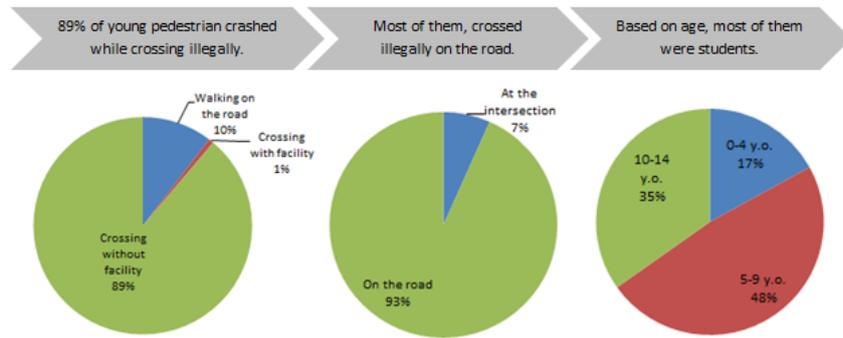


Figure 10 Chart for Young Pedestrian Casualties in Makassar (2013-2015)

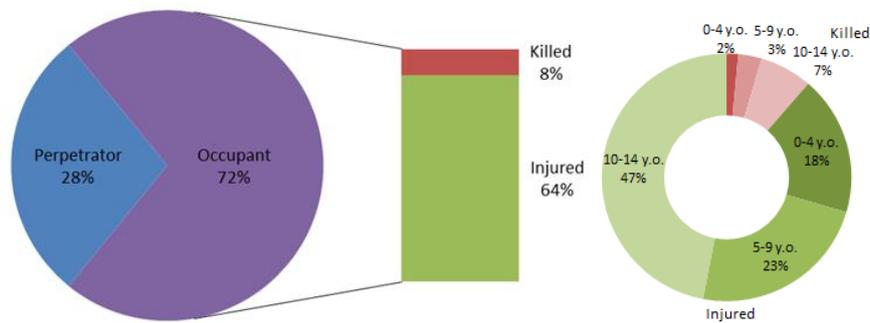


Figure 11 Chart for MTW Accident Involving Children in Makassar (2013-2015)

Semarang Metropolitan City

Semarang, is a city on the north coast of the island of Java, Indonesia. It is the capital and largest city of the province of Central Java. It has an area of 373.78 square kilometres and a population of approximately 1,8 million people, making it Indonesia's fifth most populous city and the fifth largest Indonesian city after Jakarta, Surabaya, Bandung, and Medan. The metro area had 3,183,516 inhabitants at the 2010 census spread on 2 cities and 26 districts. Greater Semarang, or called as Kedungsapur, has a population of close to 6 million. A major port during the Dutch colonial era, and still an important regional center and port today, the city has a dominant Javanese population.

In broaden data; Semarang has similar number of accident and accident rate for children casualties. But in Semarang's case, MTW casualties shared more than the pedestrian casualties. The major causes were crashes between two or more MTWs and it should be highly related with the immature MTW's rider who was involved in the MTW crashes. McKnight (2000) stated, driver under 25 years old has high risk of crashes because their maturity. Teens and new drivers are likely to be in accidents because of their inexperience compared to mature drivers. Meanwhile, lack of pedestrian crossing is still the same issue for pedestrian crashes in Semarang.

Table 6 Cross Tabulation between Road Users and Crash Type for Children Casualties in Semarang

		Semarang				
Crash	Causes	Road Users				
		MTW	Car	Bus	HGV	Pedestrian
Pedestrian crash	without facility	3	-	-	-	45
	with facility	-	-	-	-	1
Single vehicle crash	without object	2	-	-	-	2
	with object	5	-	-	-	-
Crash between two vehicles or more	turning crash	34	-	-	-	-
	opposite direction	30	1	-	-	-
	in the same direction	45	2	4	-	-

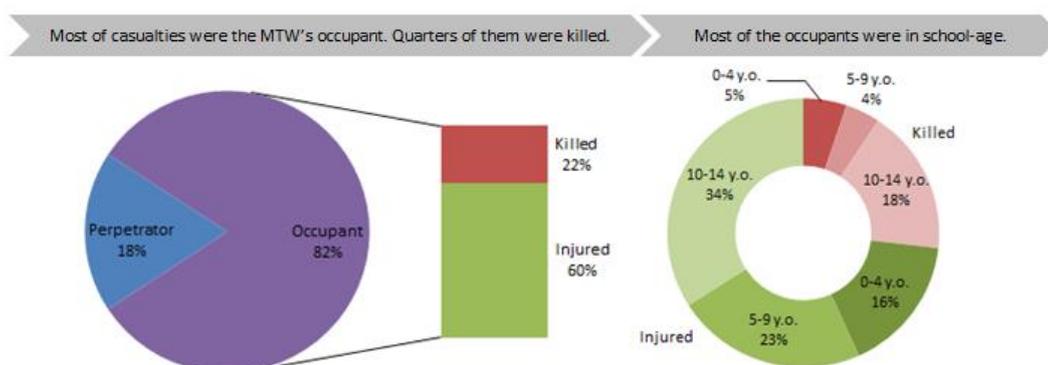


Figure 12 Chart for MTW Accident Involving Children in Semarang (2013-2015)

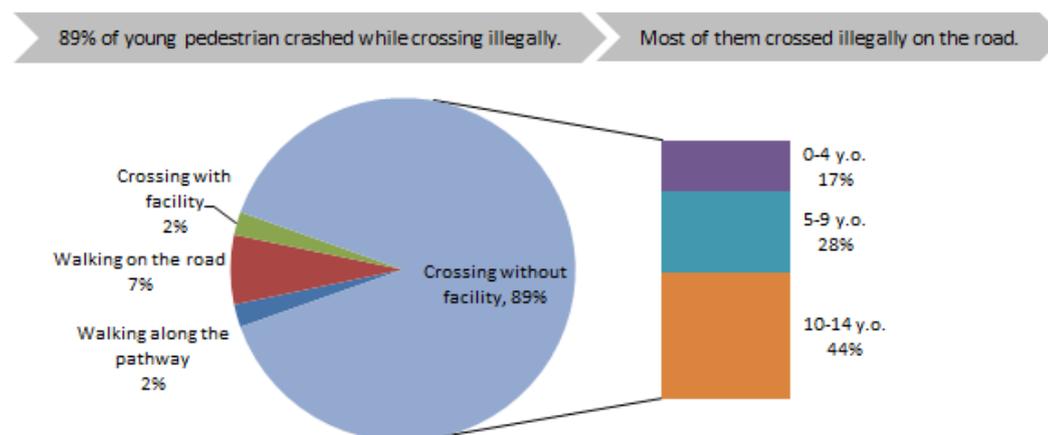


Figure 13 Chart for Young Pedestrian Casualties in Semarang (2013-2015)

Medan Metropolitan City

Medan is in the northeastern part of Sumatra island, in Sumatera Utara province. Located in the central part of Deli Serdang Regency, Medan is surrounded by satellite cities and towns such as Binjai, Lubuk Pakam, Tanjung Morawa, Tembung, Percut Sei Tuan, and Labuhan Deli which help the city become a new urban area in Indonesia which known as 'Mebidang' (Medan, Binjai, Deli Serdang).

Table 7 Cross Tabulation between Road Users and Crash Type for Children Casualties in Medan Year 2013-2015

		Medan				
Causes		Road Users				
		MTW	Car	Bus	HGV	Pedestrian
Pedestrian crash	without facility	2	-	-	-	142
	with facility	-	-	-	-	-
Single vehicle crash	without object	3	-	3	-	1
	with object	4	-	3	-	3
Crash between two vehicles or more	turning crash	38	-	3	-	-
	opposite direction	30	2	4	2	-
	in the same direction	76	3	5	1	1

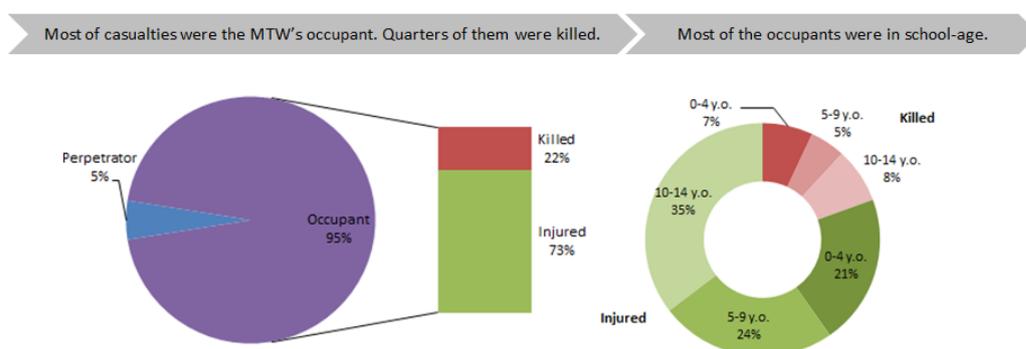


Figure 14 Chart for MTW Accident Involving Children in Medan (2013-2015)

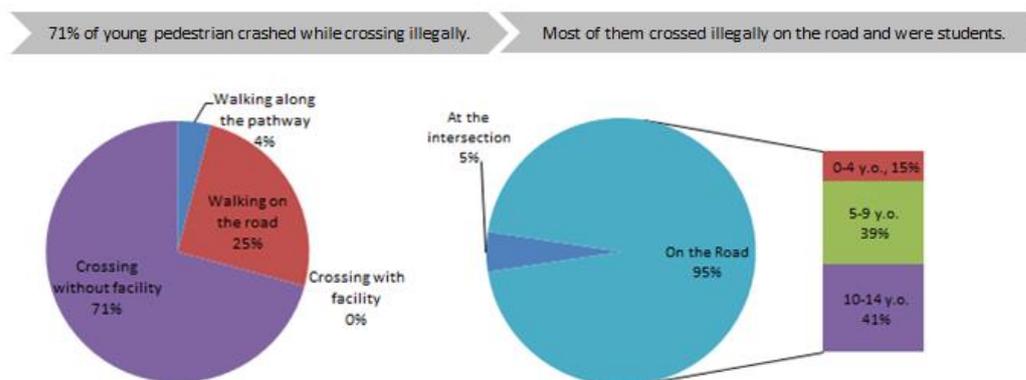


Figure 15 Chart for Young Pedestrian Casualties in Medan (2013-2015)

Medan was the metropolitan city with highest number children casualties and this sub chapter explains about the Medan's detail figure for road accident involving children. In Medan, the number of perpetrator quite low, compared with the rest of the cities. The children casualties were mostly the MTW's occupants. The number of young pedestrian crashed while crossing was still the major cause; however, there were also some number of pedestrian crashed while walking along the road. It means, not only the crossing facility, but the pedestrian path also played an important role in young pedestrian casualties.

CONCLUSION

In every city, most of children casualties were caused by MTW and pedestrian crashes. In fact, in MTW crashes, there were always children who were a perpetrator of the accident. The young perpetrator means they rode the MTW without legal license because they were under legal age (17 years old) to ride the MTW. Law enforcement is the key but it is not the only way to prevent this illegal action. Safety campaign towards parents and families will also help to understand the dangerous of riding MTW without legal license.

Beside illegal MTW riding, crossing without facility is also the major cause in every metropolitan city for pedestrian crashes. It showed that the cities have lack of pedestrian crossing. By designing proper pedestrian facilities, the number of accident and the fatalities of young pedestrian will be reduced. Most of young pedestrian were in school age. Providing proper pedestrian crossing and facilities around school area will help to prevent the road accident involving children.

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