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Research Report

Determination of the Exposure and Travel Mode to School



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MALAYSIAN INSTITUTE OF ROAD SAFETY RESEARCH

ASEAN ROAD SAFETY CENTRE

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Abstract

This study is to determine the exposure and travel mode for trip to school by survey method at 59 schools in Selangor. This study approaching parents via student as a child and student. The method was more effective and additionally, quality information was obtained.

This study aimed to collect data on exposure travel to school by the student as well as improve the quality of information on exposure travel among the student. In this study, mode travel was selected as the main variables for mode choice study. Second aims of this study are to understanding and identify what is the reason influence travel mode to school. It can contribute information to better design policies and infrastructure around the school area.

A total of 5426 parents participated in this survey, 47% have child from primary school and 53% have child from secondary school. About 26% of the student lives more than 6 km from school and 41% of parents choose motorcars as the main travel mode for their children. But the analysis shows that 66% choose “walk” mode of travel distance is less than 1 km. Although, the motorcar is the popular travel mode to school, there are some children walk/bicycle to school for almost any distance.

The authorities need to strategize the development of facilities near school. The study in travel mode choice helps the authorities build a better environment for student and community. This study recommends to authority for building the proper walkway more than 1 km from school to resident area. It can reduce the risk of exposure between home and school and develop a safe route to school.

1. Introduction

Exposure is defined as any event in traffic, limited in time and space, that has the potential of becoming an accident and places cognitive demands on road users (Elvik, 2014). The measure of exposure is generally defined as some form of amount of travel, either by vehicle or on foot (Hakkert & Braimaister, 2002). Risk is defined as the probability of accident which is the number of exposures. The risk in road safety is to quantify the level of road safety to the amount of exposure.

Road crashes involving age between 6 to 20 years old in 2016 is 5036. Accident statistics in 2016 also recorded 322 casualties at school area and involved 38 pedestrian casualties at school area (RMP, 2016).

Figure 1 shows the number of school children casualties to/from school as pedestrian from the year 2007 to 2016. The graph showed decreasing the number of school children casualties to/from school. The casualties among school children have steadily reduced from 2013 to 2016. However, fatal crash victim involving school children is consistency every year.

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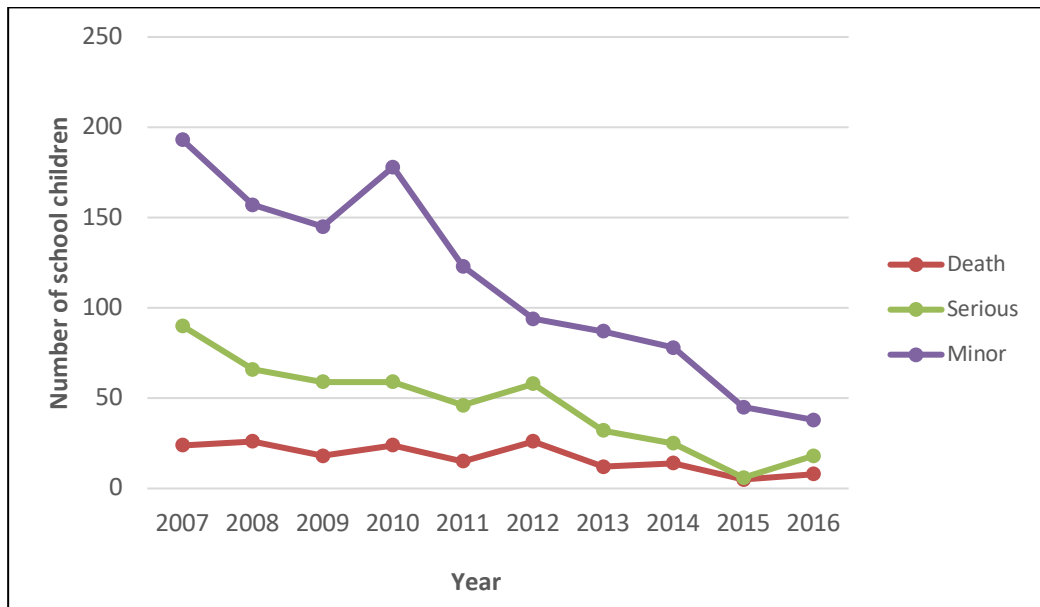


Figure 1 Number of school children casualties to/from school as pedestrian

Along with RSE that has been held in the school syllabus, the authorities have also been keen to upgrade road facilities for the student to and from school. However, the authorities need strategies about the development of facilities near school. The understanding of the travel mode choice can help the authorities to build a better environment for student and community. It can reduce the risk of exposure between home and school.

Although the RSE was implementing in school, the parents are responsible for the primary trainers to guide the children about road safety skill. Parents are also responsible as the decision-makers regarding mode and school choice for their children. Thus, in this study, the parent is the main respondent. The choice of the mode to and from school usually depends or influence by a social-economic, distance home to school, urban from and car ownership (Lang, Collins, Kearns, & Sciences, 2010). The negative perception of safety and security issue such as pedestrian injury and stranger danger might influence the mode choice for their children.

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The distance home to school not only the factor contributing to the mode choice. But, it is also can use as the exposure data. The distance home to school can develop alternative travel mode within the optimal distance. Figure 2 shows the illustration mode choice home to school. The journey from home to school is influent by the mode of transport. Although the distance from home to school is the same the choice of mode will give the difference in exposure to risk.

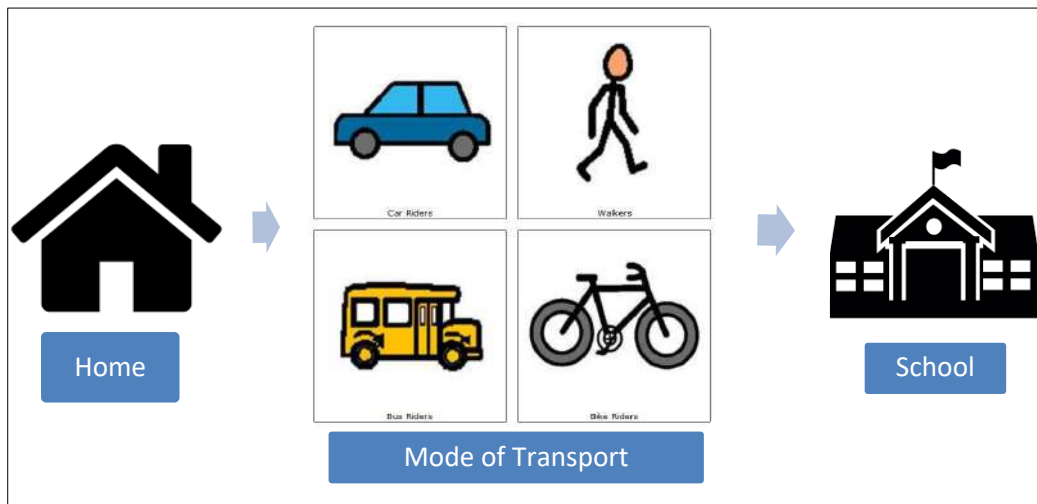


Figure 2 Illustration travel home to school

1.1 Objectives of Study

The primary aims of this study are to determine the travel mode and exposure and identify the factors affecting the mode choice for trip to school in Selangor.

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1.2 Scope of Study

The scope of the study is delineated by the objective of the study. The objectives inform the data to be collected at school. This study involved 59 schools in Selangor. A total of 5,425 parents had children between 7 to 18 years old were selected as a sample. By the result of this report, the travel mode of students, mode choice and the walk distance from home to school focus.

2. Literature Review

This section review studies and reports on travel mode choice to school and exposure travel among student. The main purpose of the review is to determine the variable for the mode choice study and methodological basis for this study.

Wilson, Wilson, and Krizek (2007) studies the implication of school choice on travel behaviour. At the neighbourhood school, student walking more than six (6) times greater than the city wide school. In the scenario without busses the city wide school had 4.5 miles travelled, costs and emission compared by providing bus service, the overall miles travelled were 60 – 70% of the scenario where no bus service provided.

There numerous paper and reports have given the fact base on adult travel pattern. From Vehicle Kilometre Travelled data, the use of the private vehicle is nearly 80%; where there are more cars than licensed drivers (JPJ, 2012). It was also reported by Frost and Sullivan (2013) that Malaysian makes an average of three (3) trips per day. Despite this, the travel statistics for children still have yet.

According to a study conducted by McMillan, Day, and Anderson (2006) human travelled every day to the office, stores and to holiday destinations to name a few. However, this study shifts the focus to the trip to school. The journey to and from school is part of the everyday routine for most children. In this, it is identified that school location is a critical factor influencing child travel behaviour.

In 2012 a total of 8938 youth between ages of 13 – 25 were involved in road accidents. PDRM record also shows 1070 youths involved in an accident within the vicinity of their institutions compared to only 82 children aged 4 – 12 years old were involved in accidents near the school.

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The road safety issue at hand is not only based on accident statistics but also focused on the probability of the risk of accident between home and school. Variable such as mode of travel and travel-way reflect the safety aspects of student travel (Norsiah, 2001). Road safety educations are not enough to change travel behaviour. The facility for pedestrian safety should provide especially near the school area.

Standard planning manuals have been introduced in Malaysia since the 1980s. Among its objective is to create a life more organized and comfortable, equipped with basic facilities and social services. Developers should ensure that these criteria are used when allocating building site in the layout plan. The local authority is responsible to ensure that the criteria are met before awarding approval to developers to begin development. The Selangor Department of Town and Country Planning has developed a second edition of the guideline and standards manual for town planning in Selangor (Manual Garis Panduan dan Piawaian Perancangan Negeri Selangor) in November 2010. Among the contents covered are social facilities which include educational facilities. A case in point, the construction of a secondary school is necessitating when the population of area exceeds 9,000 people and its distance should be located within 0.4 to 0.8 km or a travel distance of 5 to 10 minutes' journey from home. The distance makes it possible for most students to walk to school.

However, in practiced, if the street network not allows them to access the school efficiently, the school which located in neighbourhoods will not be effective in encouraging student to walk to school (McDonald, N. C., 2008) nor place a safe route to school if at all. This study also stated children nowadays do not live within a walkable distance of their schools compare children in years 1969.

From the current literature, it seems that there aren't been much research on the children travel mode. An issue which needs to be addressed is knowledge gap on student travel mode to school. Therefore, this study aims to identify what is the reason influence travel mode to school and also to address the exposure and mode choice between students and school, school location and parents' workplace as it can contribute information to better design policies. Thus, the road safety issue at hand is not only

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based on accident statistics but also focused on the probability of the risk of an accident between home and school.

3. Methodology

This section describes the process used to obtain and analyse the data in order to achieve objectives of the study. The study aimed to determine the exposure travel and mode by student and to understand mode choice for a trip to school.

Figure 3 below shows the flow chart of the study. The first component in the flow chart is desk study; consists of the determination of study location and the sample design. The second component is design questionnaire with the final component is data collection, data gathering and data analysis.

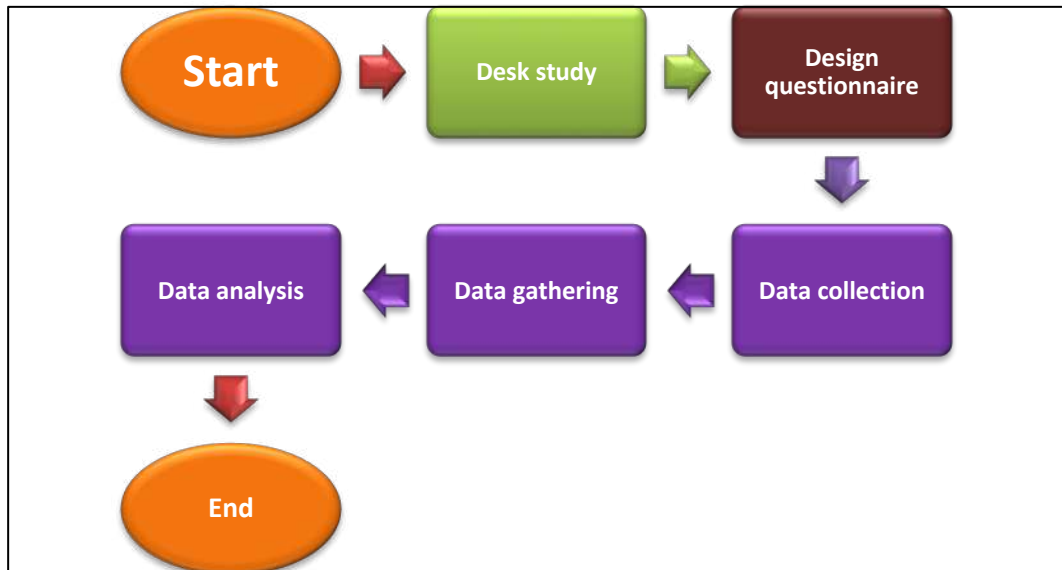


Figure 3 Research framework

3.1 Desk Study

This study was conducted among school students in Selangor state. Approval from the Ministry of Education (MOE) and Selangor Education Department (JPN) is required before conducting this study. There are 59 schools was selected for this study. These schools are categorized in the type of road, urban or suburban and risk or non-risk based on International Road Assessment Programme (IRAP) category.

The total enrolment in 2016 in Malaysia is 2,685,403 students for primary school and 2,188,525 students for secondary school. Selangor is the highest enrolment students for standard one. Selangor state education department was reported until Jun 2017, there were 512,749 students in 659 primary schools and 375,852 students in 277 secondary schools around Selangor.

Figure 4 shows the total number of students by district. There are 10 districts in Selangor; Gombak, Hulu Langat, Hulu Selangor, Klang, Kuala Langat, Kuala Selangor, Petaling Perdana, Petaling Utama, Sabak Bernam and Sepang.

The highest student is from Petaling Perdana which is 172,814 students from 139 schools. The lowest student is from Sabak Bernam district which is 24,465 students from 64 schools. The average number of student for one (1) school in Selangor is 950 students.

For this study, the random sampling was used to provide a useful and cost-effective sample with a 95% confident level of critical value is 1.96 and error is 0.02. The minimum sample size is 2,400 for each type of school; primary and secondary school.

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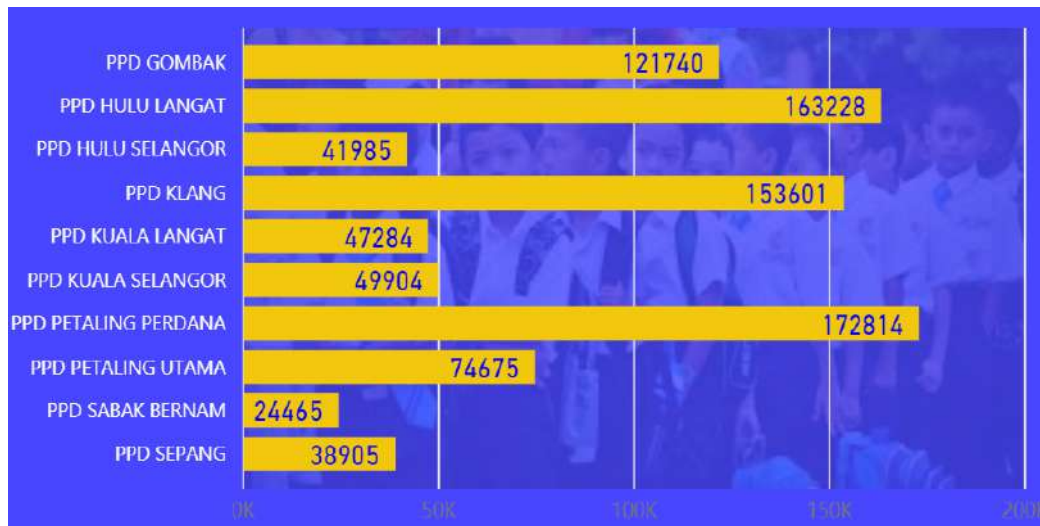


Figure 4 Total number of student by district (Selangor State Education Department, 2017)

The respondents for this study were a parent of the students. It is because the student could not estimate their travel correctly (Tetali, Edwards, Murthy, & Roberts, 2015). In addition, parents are the decision-maker for their children. They will choose the mode of transport for their children to and from school. Parents will choose travel mode to school based on convenience, accessibility, safety and security. The location of home, school and workplace also might be the factor influencing the mode choice to and from school.

3.2 Design Questionnaire

The main tools for this study are questionnaire. Towards establishing the questionnaire, the test of respondents understanding of the question is carried out. The questionnaire is divided into two (2) categories. Part A is the student information. This part aimed to collect information on characteristic of the student and particular factor relating to school travel. Part B is about the mode choice. Part B was made to collect data related to distance and mode transport from home to school. Figure 5 shows the variables or data obtained from the questionnaire.

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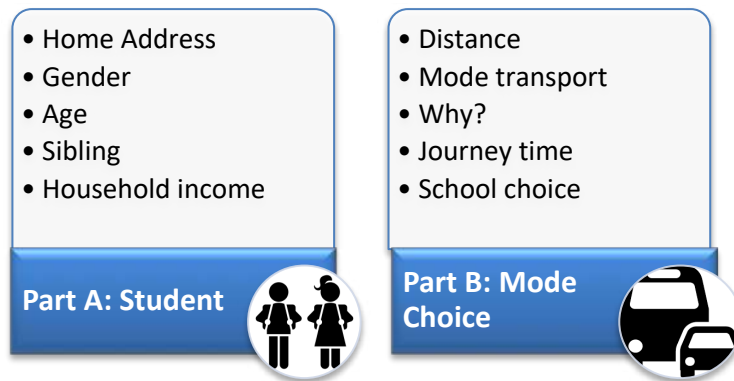


Figure 5 Categories of questionnaire

Student information (e.g., home address, gender, age, sibling and household income) and mode choice (e.g., distance home to school, mode transport, reason choose that mode, duration travel home to school and school choice) were included in the questionnaire. At this section, parents need to select the main mode of transport and school. This questionnaire used in Bahasa Malaysia.

The questionnaire came with the Coat of Arms of Malaysia and MIROS logo to inform respondent that the study is conducted by a government agency and not for individual use (Figure 6). A clearer instruction to fill the questionnaire was given to enable respondent to answer the question effectively.



Figure 6 The Coat of Arms of Malaysian and MIROS logo

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3.3 Data Collection

There are 59 schools selected for questionnaire distribution to parents. The primary data used in this study come from questionnaire (see 3.2), which is conducted by the Malaysian Institute of Road Safety Research (MIROS). The data set includes the student information and travel from home to school obtain in Selangor from May to October 2017.

The data collection needs approval from the MOE and Municipal Office Education (PPD) because the authorities are concern about student safety and security. Once receive approval from MOE and PPD, a letter of authorization to school was made and delivered a questionnaire to the teacher. In each primary school selected, the teacher randomly selected 2 classes from Level 1 (Standard 1, 2 and 3) and Level 2 (Standard 4, 5 and 6). In each secondary school selected, the teacher also randomly selected 2 classes from Lower Secondary (Form 1, 2 and 3) and High Secondary (Form 4, 5 and 6). This study chose to drop-off type questionnaire survey. The teacher will present the questionnaire to parents through the student and be handed back to the teacher for collection. The questionnaire was used to collect after two (2) weeks of the delivered questionnaire to the teacher.

3.4 Data Entry and Analysis

Respondent (parents) had to return the completed questionnaire to the teacher via their children. This study wholly depends on the data collected from the respondent. The questionnaire returned received by MIROS researcher. After the collection of the questionnaire, the data stored in the Statistical Package for Social Science Software (SPSS) for further analysis. Figure 7 shows the data from the questionnaire was enter into the softcopy for further analysis.

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	bil	sekolah	Lokasi	kategorijalan	risiko	kategoriesekolah	tahap	alamat	jantina	umur	jajaan	pendapatan
1	1	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 17, jln, GU 3/3, trn ga		Lelaki	10	3	\$10,000
2	2	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 Blok A-G-9, Jalan RP5, Ta...		Perempuan	10	1	\$1,500
3	3	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 31 jalan GU 2/3 Taman Ga...		Lelaki	10	2	
4	4	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 27 jalan desa 7/4, band...		Lelaki	10	2	\$4,000
5	5	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 20, KE Kota Emerald 4...		Perempuan	10	2	\$4,000
6	6	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 29, Jln KE 2/17 Kota E...		Perempuan	10	2	\$8,000
7	7	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 33-1, Jalan Amansiera...		Perempuan	10	1	\$9,000
8	8	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 14 Jln GU 3/9, TMN Ga...		Perempuan	10	1	\$10,000
9	9	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 57, Jalan bersatu 4, ta...		Perempuan	10	2	\$10,000
10	10	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 10, jln GU 1/8, Trn Ga...		Lelaki	10	1	\$3,260
11	11	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 77, Jln Bersatu 3, Tam...		Perempuan	10	1	\$4,000
12	12	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 87, Jln Bersatu 17, Ta...		Perempuan	10	2	\$7,000
13	13	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 53, Jln Seri Hijau 5, Ta...		Lelaki	10	1	\$12,000
14	14	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 25, Jln RP 11/7, Rawa...		Lelaki	10	2	\$3,500
15	15	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 10, Jalan GP1, Taman...		Lelaki	10	1	\$12,000
16	16	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 5 Jln RP 11/2, Trn Ra...		Lelaki	10	1	\$10,600
17	17	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 47, Jln 1 Taman Sei Ra...		Lelaki	10	2	\$2,800
18	18	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 12, Jln 1F Taman Jati...		Perempuan	10	1	\$1,384
19	19	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 28, Jalan 1 D, Rumah Mur...		Perempuan	10	1	\$3,000
20	20	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 Taman Desa Sri Bayu Ra...		Perempuan	10	1	\$300
21	21	SK Sinaran Budi	Rural	Jalan Utama/ Primary/ ...	Ya	Rendah	Tahap 2 No 29, Jalan RP 10/9, Ra...		Lelaki	10	2	\$4,900

Figure 7 Example of input data in SPSS

The objective of this study was to determine the school travel and mode for trip to school. The exposure variables were distance and time to school. Although the questionnaire has asked about the distance, the researcher also estimated distance from home to school using Google Map based on the school location and home address. Distance to school was categorised as, 0.0 to 1.1 km, 1.1 to 2.0 km, 2.1 to 3.0 km, 3.1 to 4.0 km, 4.1 to 5.0 km, 5.1 to 6 km and > 6 km. Mode of transport was categorised as walk, bicycle, motorcycle, motorcar and bus (e.g; school bus, school van and stage bus – combine because it is transport paid by parents).

Moreover, the data from the survey gathered to understanding mode choice for a trip to school. The different of the distance by mode of transport to school is carried out to understanding the choice of the mode influenced by distance. Type of analysis for this study was descriptive analysis. The descriptive analysis summarized data set by developing graphical presentation and population of the data. Descriptive analyses were used to obtain information on the distribution and variability of a variable. The analysis was presented by histogram and chart.

4. Results and Discussion

This section discussed the descriptive data and findings from data analysis. Details of analysis by schools involved were discussed in sub-section below. Figure 8 shows the spatial distribution of schools involved.

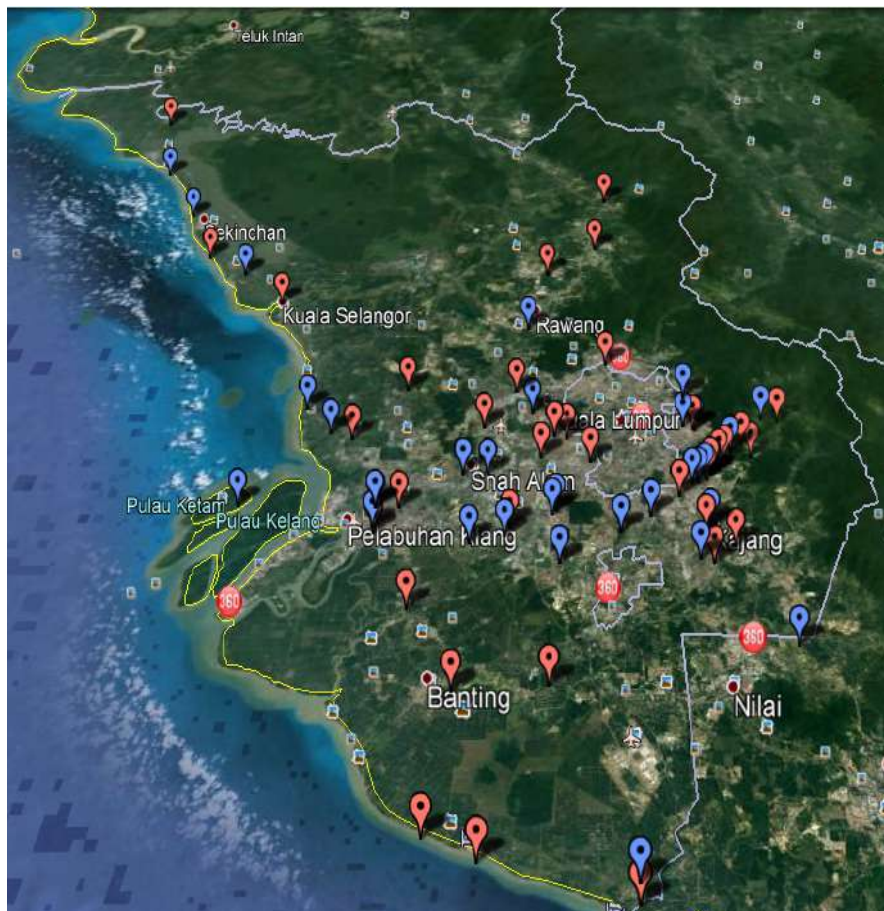


Figure 8 Distribution of schools involved

4.1 Descriptive Analysis of the Characteristic

4.1.1 Characteristic of School

A total of 5,426 respondents filled the questionnaire which is from 59 schools in Selangor. Table 1 shows the list of school involved in mode choice study. The percentage of respondent involved in this has child 47% from primary school and 53% from secondary school.

Table 1 List of schools involved in mode choice study

No.	Name of school	Level of student classes				Total	%
		Level 1	Level 2	Lower secondary	High secondary		
1	SK Sinaran Budi	0	48			48	.9
2	SK Abdul Samat	41	49			90	1.7
3	SK Telok Gadong	61	61			122	2.2
4	SK Sg Udang	38	28			66	1.2
5	SJKC Ying Wah	50	56			106	2.0
6	SK Sg Hj Dorani	14	52			66	1.2
7	SK Sg Leman	28	76			104	1.9
8	SK Tanjong Karang	16	58			74	1.4
9	SK Tambak Jawa	30	31			61	1.1
10	SK Taman KOSAS	24	41			65	1.2
11	SK Ampang	20	50			70	1.3
12	SK Hulu Kelang	1	119			120	2.2
13	SK Taman Melawati 2	56	58			114	2.1
14	SK Seksyen Enam	49	46			95	1.8
15	SK Seksyen 13	0	59			59	1.1
16	SK Sg Pelek	35	37			72	1.3
17	SK Seksyen 9 Kota Damansara	22	39			61	1.1
18	SK Putra Heights 2	48	43			91	1.7

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19	SK Pulau Meranti	41	51		92	1.7	
20	SK Pusat Bandar Puchong 2	50	20		70	1.3	
21	SJK (T) Castlefield	32	33		65	1.2	
22	SK Beranang	25	33		58	1.1	
23	SK Batu 9	45	41		86	1.6	
24	SK Taman Sungai Besi Indah	45	40		85	1.6	
25	SK Taman Universiti	133	182		315	5.8	
26	SK Dusun Nanding	0	48		48	.9	
27	SK Bukit Rimau	50	41		91	1.7	
28	SK Seksyen 7	31	32		63	1.2	
29	SK Jalan Semenyih 1	18	14		32	.6	
30	SK Sujana Impian	21	46		67	1.2	
31	SMK Bukit Sentosa 2			47	62	109	2.0
32	SMK Syed Mashor			60	60	120	2.2
33	SMK Dato Hj Kamaruddin			35	43	78	1.4
34	SMK Convent			58	62	120	2.2
35	SMK Pandamaran Jaya			0	60	60	1.1
36	SMK Pengkalan Permatang			39	33	72	1.3
37	SMK Bandar Baru Sg Buloh			36	46	82	1.5
38	SMK Sg. Burong			82	38	120	2.2
39	SMK Puncak Alam			59	57	116	2.1
40	SMK Tengku Idris Shah			0	119	119	2.2
41	SMK Taman KOSAS			53	58	111	2.0
42	SMK Alam Megah			61	26	87	1.6
43	SMK Telok Panglima Garang			60	61	121	2.2
44	SMK Batu Laut			60	59	119	2.2
45	SMK Tanjung Sepat			52	57	109	2.0

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46	SMK Pantai Sepang Putra	34	41	75	1.4		
47	Kolej Vokasional Sultan Abdul Samad	0	120	120	2.2		
48	SMK Bukit Changgang	44	46	90	1.7		
49	SMK Damansara Utama	24	3	27	.5		
50	SMK Bandar Utama Damansara (2)	57	54	111	2.0		
51	SMK Kelana Jaya	48	41	89	1.6		
52	SMK La Salle	58	54	112	2.1		
53	SMK Subang	54	55	109	2.0		
54	SMK Selayang Bharu	52	28	80	1.5		
55	SMK Bandar Tun Hussein Onn 2	88	0	88	1.6		
56	SMK Dusun Nanding	62	28	90	1.7		
57	SMK Jalan Reko	63	51	114	2.1		
58	SMK Sultan Abdul Aziz Shah	54	60	114	2.1		
59	Kolej Vokasional Kajang	57	51	108	2.0		
	Total	1024	1532	1397	1473	5426	100.0

From data of 59 schools gathered, it can be summarised that 52.5% is located in the urban area and another 47.5% at the sub urban area. The school sampling used, in line with Selangor State Education Department (SED, 2017) there are 55% school are located in the urban area and 45% was built at the sub urban area. It is shown that the respondent represents the population on this survey.

Figure 9 showing the characteristic of the school area in mode choice study. 35.6% school located on resident road/local street. Second higher is located on the federal road/arterial (33.9%) and 30.5% is located on the main road/collector. The categorize of the risk at school is based on the list of school from the Ministry of Education Malaysia (MOE). For this study, 57.6% school are located at risk area and another 42.4% school is located in the non-risk area.

Determination of the Exposure and Travel Mode to School

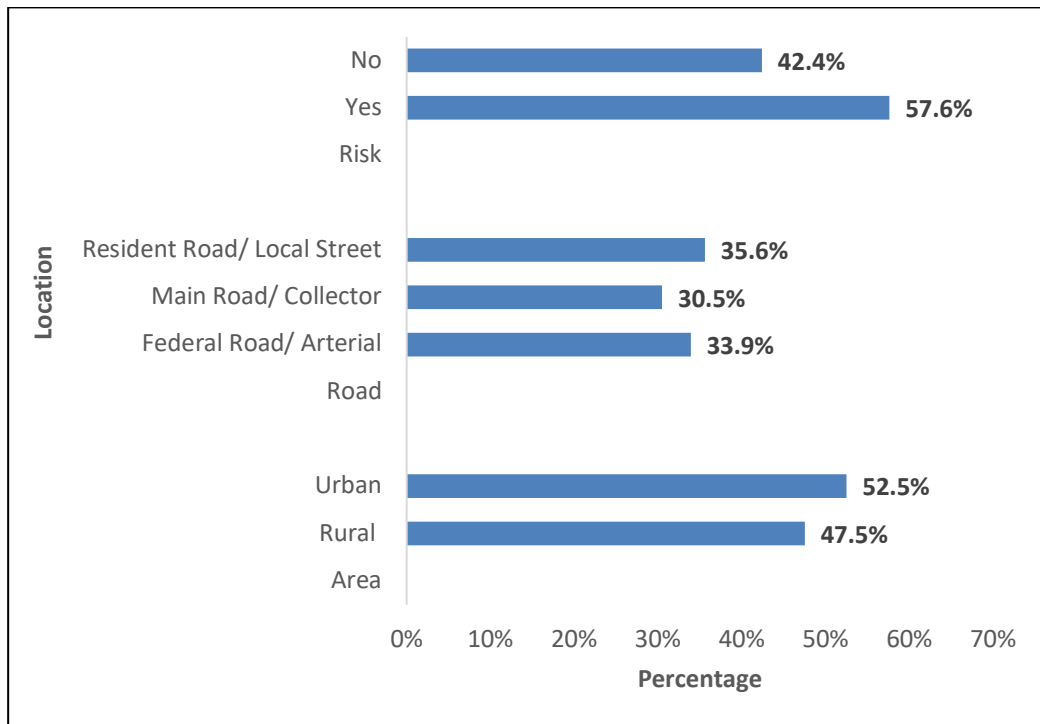


Figure 9 Characteristics of the school area in mode choice study

4.1.2 Characteristic of Respondents

Figure 10 shows the number of children attend the same school or same area. From the figure, 2961 respondents have only one (1) child at the same school and 1776 respondents have two (2) children at the same school. 448 respondents have three (3) children and only 125 respondents have more than 4 children at the same school or same area. (Same area: Some primary and secondary school is located beside each other).

Determination of the Exposure and Travel Mode to School

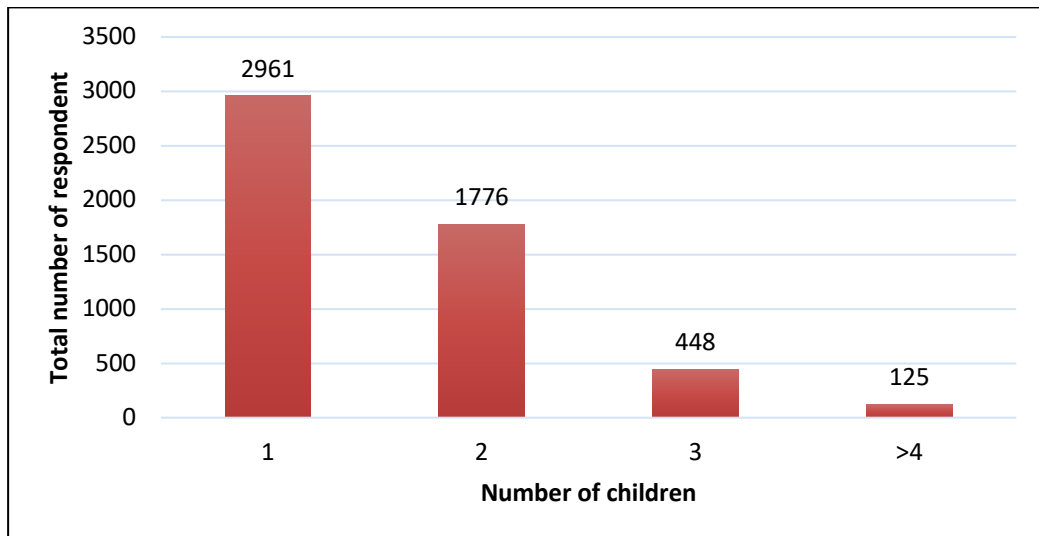


Figure 10 The number child attends the same school/same school area

Figure 11 shows the gender versus the level of education of respondent children. As for the gender of the respondent children, 42% were males and 58% were female. The percentage of respondent (return rate) is lower at Level 1 is because it might be the student did not give the questionnaire to the parents and the questionnaire is lost. (Note: Level 1 is a new student, not more three (3) years in the school).

Determination of the Exposure and Travel Mode to School

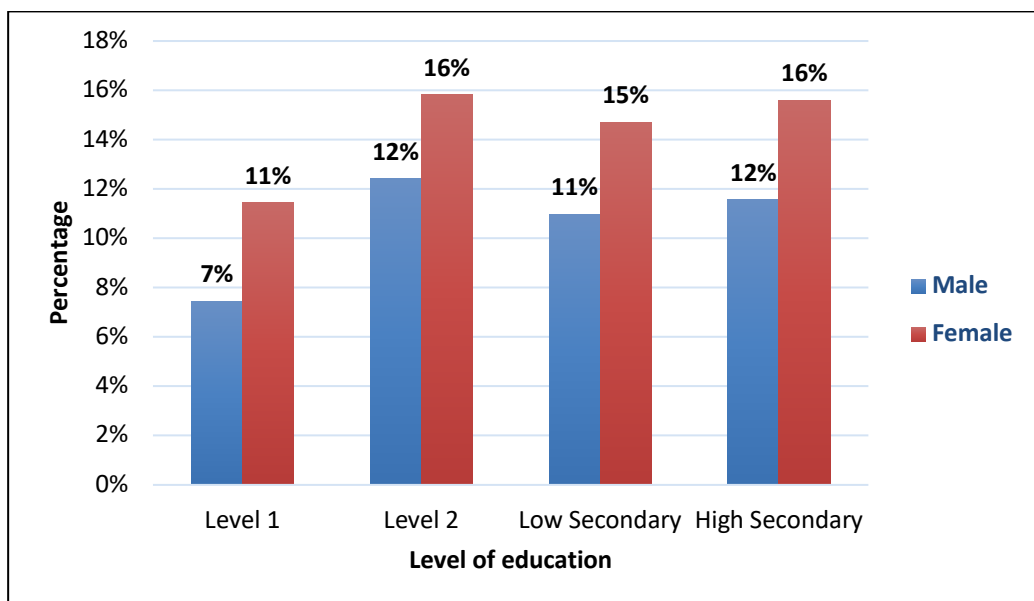


Figure 11 Gender versus level of education of respondent children

Table 2 shows the majority of respondents at 61.1% earned a household income less than RM4000. This was followed by those in the RM4001 – RM8000 range which is 17.2%. The mean household income is RM4,412.

Table 2 Number of respondents by respondent's income

Income (RM)	Total	Percentage (%)
0 – 4,000	3313	61.1
4,001 – 8,000	935	17.2
8,001 – 12,000	400	7.4
12,001 – 16,000	121	2.2
>16,000	657	12.1
Total	5426	100.0

4.2 Distance Travel

Table 3 shows the travel distance from home to school by the respondent children (student). 26% of the student lives more than 6 km. Followed by less than 1 km which is 22%. This is might be some of the students they are living in the hostel on the weekday and go home on the weekend.

Table 3 Travel distance from home to school by respondent children (student)

Travel distance (km)	Total	Percentage (%)
0 to 1	1171	22
1.1 to 2	893	16
2.1 to 3	706	13
3.1 to 4	378	7
4.1 to 5	671	12
5.1 to 6	204	4
>6	1403	26
Total	5426	100

Table 4 shows the travel time to school by the respondent children (student). 45% of the student travel 5 to 10 minutes to school. Followed by the 11 to 20 minutes range which is 24%. The travel time is not only influenced by the distance but the type mode of transport also affects the travel time from home to school.

Table 4 Travel time to school by respondent children (student)

Travel time (min)	Total	Percentage (%)
Less than 5	911	17
5 to 10	2399	45
11 to 20	1288	24
21 to 30	568	11
More than 30	207	4
Total	5373	100

Determination of the Exposure and Travel Mode to School

Most of the respondent has only one (1) child at the same school. There is a possibility that there are more than four (4) children at the same school or area of the school. This study found the student most of them do not live within a walkable distance of their schools. This finding is similar to McDonalds, 2005. It is not encouraging student to walk to school nor a safe route.

4.3 Mode Choice

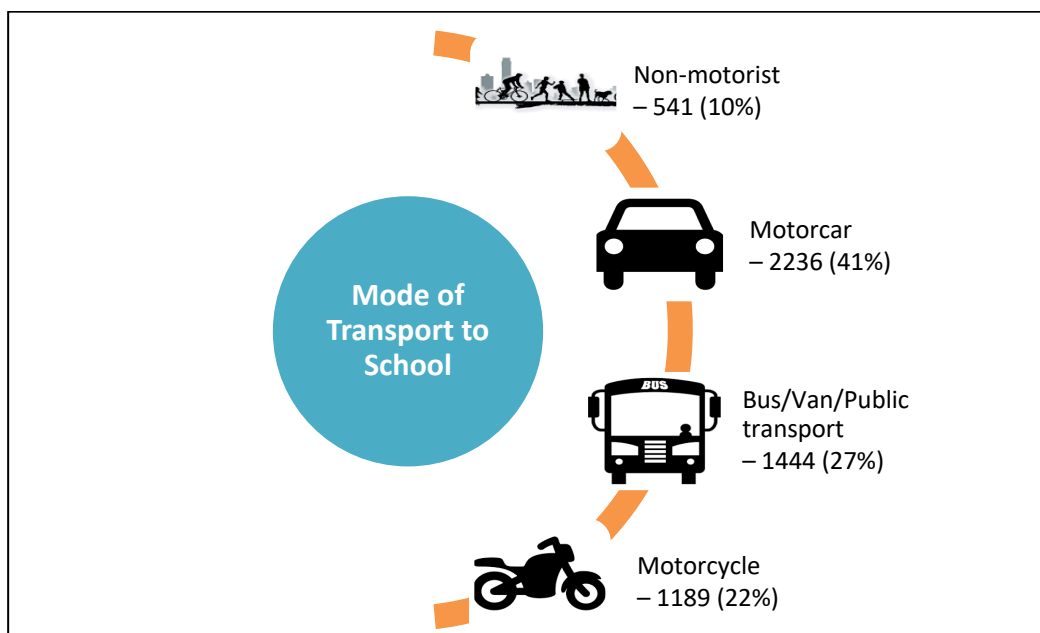


Figure 12 Mode of transport to school

Figure 12 summarised the type of mode of transport used by student to commute to school daily. The main school travel mode is motorcar which is amounted of 41%. This is followed by school bus/van and public transport which is 27% and about 22% of the respondent children chose the motorcycle as the school travel mode. The non-motorist (walk and bicycle) is only 10% as the mode of transport to school.

Determination of the Exposure and Travel Mode to School

Travel mode choice might be influenced by distance travel by respondent children (student). Table 6 shows the percentage mode choice to school by distance. Accordingly, 66% of parents choose “walk” as a mode of transport for those who live within 1 km from the school. Majority of parent prefer to choose the “bicycle” and “motorcycle” as a mode to school when the distance from home to school less than 1 km to 2 km. Most of the parents choose the motorcar and bus when the distance home to school more than 6 km.

Table 5 Percentage mode choice to school by distance

Distance (km)	Walk	Bicycle	Motorcycle	Motorcar	Bus
0 – 1	66%	45%	26%	16%	11%
1.1 – 2	10%	33%	20%	17%	14%
2.1 – 3	3%	8%	13%	14%	16%
3.1 – 4	1%	4%	8%	6%	9%
4.1 – 5	3%	5%	10%	14%	16%
5.1 – 6	1%	0%	4%	3%	5%
> 6	16%	5%	19%	30%	29%
Total	8%	2%	22%	41%	27%

Figure 13 shows the percentage of reason respondent choice for travel mode to school. There are 46% respondent choose the travel mode to school based on perceptions of safety and security (road safety and stranger danger). Both, 16% of the parents do not have other choice and save cost. About 10% of the parent choose that mode because of the location of the school and workplace on the same route. Only 9% of the parents give the reason they choose a mode based on save time.

Determination of the Exposure and Travel Mode to School

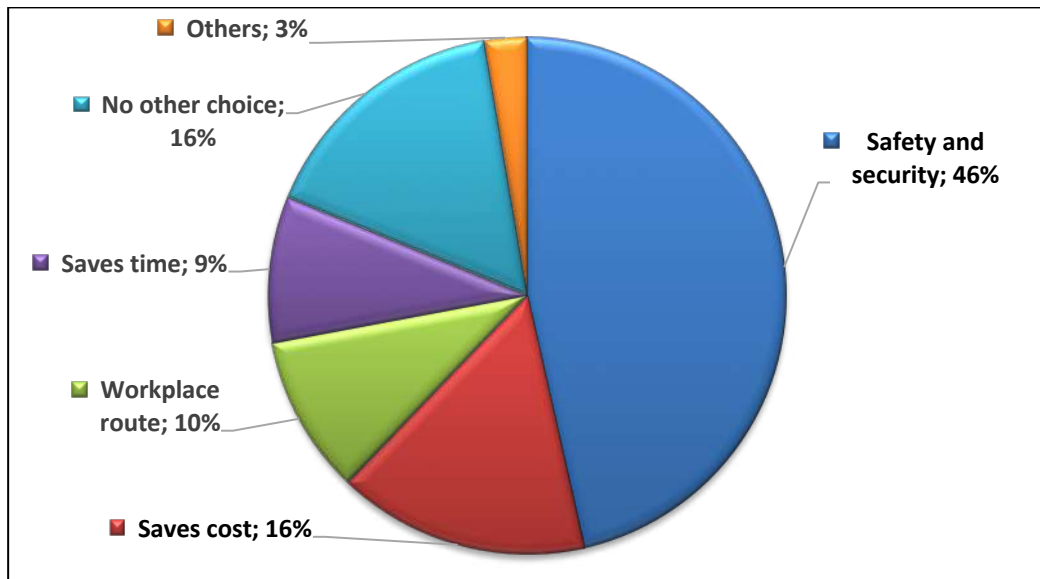


Figure 13 Percentage of reason respondent choice for travel mode to school

Most of the parent choose the motorcar as the main travel mode for their children to school. The convenience, speed, comfort and flexibility is the reason they choose this transport as the main travel mode (Nordlund, A. M., & Garvill, J., 2003). Although, the motorcar is the popular travel mode to school, there are some children walk/bicycle to school for almost any distance. This is might be influence by the environment, social and psychological. The high traffic creates the hazard to children who walk/cycle (Collins & Kearns, 2001).

5. Conclusion and Recommendation

Most of the student lives more than 6 km. This is might because of the data collected include the boarding school. For future analysis, this school should be out of the analysis because it is influencing the exposure analysis. Besides they are having lower risk when travelling to school. The hostel usually nearby the school and there is not heavy traffic because only a few of the parents drop off/on the daily student.

This study concludes that the motorcar is the main travel mode from home to school. It is because the parent felt safe and secure if they drop-off their child to school. However, the high traffic creates the hazard to non-motorize mode. Thus, the facilities such as segregation between pedestrian and road way should upgrade. This not only for traffic safety but also for the security of the student who encountering strangers.

From this study, the authorities can strategize the development of facilities near school. Improving the walkway and crossing infrastructure can reduce risk exposure and develop a safe route to school. Because of the costing on construction work, this study recommends that the proper walkway and crossing can build at least 1 km between resident area and school. The walkway facilities are not only for the school children who walk to school, but the children who waiting for their parents to pick-up and drop-off also need protection from the road way.

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Research Report

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