



## CHILD RESTRAINTS SYSTEM USE AMONG CHILDREN WHILE TRAVELLING TO DAY CARE CENTRES KAJANG, MALAYSIA

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### ABSTRACT

*Research has shown that restrained occupants in vehicles have lower risk of injuries when involved in crashes compared to unrestrained occupants. However, children are often seen not to be restrained when travelling in vehicles on Malaysian roads. This paper presents the results of an observational survey of child restraint system (CRS) usage, conducted in the first half of 2012, within the mukim of Kajang, a suburban sub district in the state of Selangor. Children aged 6 years and below, travelling in M1 class vehicles were observed by two trained observers at selected day care centres when they were being sent in the morning. Observation variables were children seating location, child restraints use and seat belts use by adult occupants.*

*Of the 537 children observed, only 9.5% were using CRS. 13% of children seated in front passenger seats were restrained, compared to only 5% for those seated at the rear. 22% of children driven by belted drivers were restrained, compared to only 7% driven by unbelted drivers. 15% children were restrained by female drivers compared to only 5% when driven by male drivers.*

*Significant factors associated with CRS use among children were seating position of children, seat belt use by drivers and female drivers. The low use of child restraint presents a challenge in reducing of crash injuries and fatalities involving children. More educational campaign for parents and guardians are necessary to instigate awareness on the importance of child restraint use.*

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**Keywords:** Child restraints, Observational survey, Seatbelt usage, Road safety, Child safety, Vehicle safety.

## 1. INTRODUCTION

According to the World Report on Child Injury Prevention, road fatality rates are greater in low and middle income countries than high income ones for children aged 14 and below. The report also stressed that road traffic injury is the ninth leading cause of fatality among 1 to 4 year olds [1]. A 2004 study on child safety seat usage in Malaysia, found that only 27.4% drivers were found to be using at least one child safety seat [2]. An overview by Norlen, et al. [3] found that the leading group of casualties in private vehicles are children aged 1 to 4, accounting for 43.8% of all casualties in Malaysia. They also found that traffic crashes involving children aged 1 to 4, occurred mostly in residential areas. Another observation study done in United Arab Emirates found that only 4% of children seated in the front passenger seats of vehicles sampled were properly restrained [4].

Child restraint systems (CRS) have proven to reduce the number of injuries and fatalities of children when involved in a crash that when used properly. A review by Zaza, et al. [5] noted that the systems can reduce fatalities among infants by approximately 70%, and among children aged 1 to 4 years by 54%. Germany has recorded a reduction of child fatalities of 75% between 1995 and 2007, while the number of seriously injured showed a 57% reduction [6].

Observational studies on the use of CRS have been very few in this country. There was only one identified so far, conducted by Kulanthayan et al. [2], in 2004. In that study, only 27.4% of drivers were found to be using at least one child safety seat in their vehicle [2]. Based on available records, very few studies on the subject have been conducted in low and middle income countries, where the use of CRS is not legally mandatory. Based on the WHO Global Status Report on Road Safety 2009 [7], Brunei, Cambodia and Singapore are the only ASEAN countries that have a child restraint law.

## 2. METHODOLOGY

An observational study was conducted on the CRS usage between March till June 2012. The study was carried out in the mukim (sub-district) of Kajang, in the district of Hulu Langat. Hulu Langat is one the nine districts in the state of Selangor. The observational survey was conducted during week days.

In Malaysia, most non-school going children, aged 6 and below are usually sent to day care centres, especially among those whose both parents are working and without domestic maids. As such, day care centres were deemed to be the practical sites to observe child restraint use pattern. Several similar observational studies used preschool or day care centres as observation sites [6, 8-10]. The Hulu Langat district office of the Department of Social Welfare provided the list of registered day care centres. From the list, only day care centres within the boundary of Kajang were identified.

Based on the Malaysian 2010 National Census, there are 30,825 children aged 4 and below and 29,975 aged between 5 and 9, in Kajang. 400 children were determined to be observed to represent Kajang. Estimating that each day care centre would have at least 16 children aged 6 and below, observation would be conducted at 25 day care centres, for a total of 450 children. This estimation

was done as the number of children aged 0 to 6 enrolled in day care centres within Kajang was not available before the start of study.

The 25 day care centres were randomly selected. This follows other observational studies practice, where their observation sites were randomly selected as well [4, 6, 11, 12]. Consent to conduct the observation was obtained from the selected day care centres. Those that did not wish to participate in the study, would be replaced by another day care centre, which was again, randomly selected. The day care centre operators were informed of observation methodology in detail. They were also requested not to inform the parents or guardians of the observation activity in advance. This was to avoid parents changing their daily routine of transporting children to the day care centres.

Observations were conducted continuously for 1.5 hours, between 7.00am to 8.30am, and only once at each day care centre. At each site, two observers were stationed outside the day care centre compound, so as not to impede the usual activity at the day care. As a vehicle approached the day care centre, observers recorded the following details:

1. Only children estimated to be 6 years old and below were observed. If a vehicle had both children aged 6 and below as well as 7 and above, only those aged 6 and below were counted and recorded. Children aged 7 and above were distinguished by their wearing of primary school uniform
2. Type of vehicle. Only vehicles designed for carriage of 9 occupants were observed (M1 type vehicles as per European Commission Directive 2007/46/EC [13]). These included cars, multipurpose vehicles (MPV), sport utility vehicles (SUV), pickup trucks and 9 passenger vans. Vehicles with heavily tinted windscreen and windows were excluded from the observation.
3. Seating position of occupants, both adults and children,
4. Gender of driver and adult occupants,
5. Occupants use of restraints, seat belts for adults and child restraints for children,

For this observation study, a child was considered restrained according to the definition below [14]:

1. Restrained in a rear facing safety seat if the child appeared to be on a seat in top of the vehicle seat, faced the rear of a vehicle and there were harness straps across the child,
2. Restrained in a front facing safety seat if the child appeared to be in a seat on top of the vehicle seat, faced the front of the vehicle, and there were harness straps across the front of the child,
3. Restrained in a high backed booster seat if the child appeared to be in a seat on top of the vehicle seat and there was a shoulder belt across the front of the child; and
4. Restrained in a seat belt or backless booster seat if there was a shoulder belt across the front of the child but the observers could not see whether the child was in a seat on top of the vehicle seat.

Complying with the definitions above, children observed in the following situations were considered as unrestrained when:

1. Children who used adult seatbelts without the appropriate CRS,

- Children seated on adult lap, regardless of being belted together with adult occupant or otherwise.

Data was recorded manually using a form. The data was later keyed into SPSS data base for cleaning and analysis. Frequencies were calculated, cross-tabulation was performed and 95% CI were calculated. Chi square analysis was performed to compare child restraint use with seat position of child, use of seatbelt by driver and gender of driver.

The primary outcome of this study was to determine if the use of CRS was significantly associated with seatbelt use of driver, seating position of child in the vehicle and driver gender. Other studies have shown that CRS was more likely to be used with belted driver [8, 9, 14, 15] and female driver [8, 14, 15]. Children under 12 are recommended to be seated at the rear, properly restrained using CRS [16].

### 3. RESULTS

A total of 537 children aged 6 and below were observed during the study. These children were travelling in 345 vehicles, with passenger cars being the predominant type of vehicle (77%), followed by MPVs (22%). 182 male and 163 female drivers were observed driving the vehicles. Only 11% of male drivers were wearing seatbelts, compared to 17.8% among female drivers. 51.4% of the children were seated in the front passenger seat, 45.3% were seated in the rear and 3.3% were seated on the driver's lap. Of the children seated on other people's laps, 8.6 % were in the front passenger seat, 2.6 % in the rear seat. None of the children sitting on laps were restrained. Overall use of CRS was 9.5%. The use of CRS by seating position within the vehicle is shown in Figure 1. There was a significant association between use of CRS and their seating positions in a vehicle  $\chi^2(1)=10.733$ , p-value <0.001. This significant association reflects the findings that 13.3% of children seated in front passenger seats were restrained compared to only 4.9% of those seated in the rear seats. This represents the fact that based on the odds ratio; the odds of child restraint use were 3 times higher if the children were seated in front compared to being seated in the rear seats (OR=2.944; 95% C.I = 1.505, 5.760).

**Figure-1.** Child Restraint Use by Seating Position

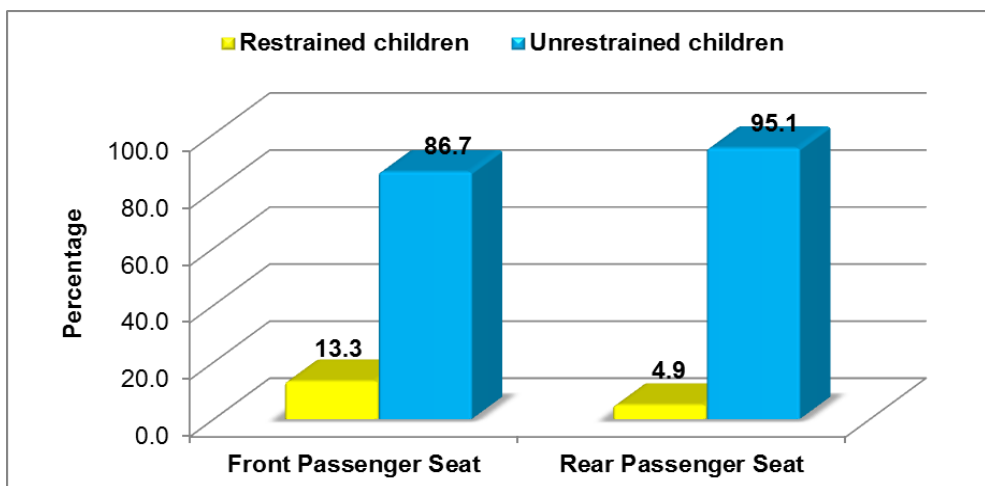


Figure 2 shows the use of child restraint by use of seatbelts by drivers. There was a significant association between the use of child restraint and use of seatbelts by drivers ( $\chi^2(1)=18.813$ , p-value  $<0.0001$ ). When driven by drivers who wore seatbelts, 21.7% of the children were restrained. In comparison, only 6.6% children driven by unbelted drivers were restrained. As such, the odds of child restraint use were 4 times higher if the drivers were belted compared to unbelted drivers (OR=3.908; 95% C.I = 2.036, 7.499). Similar significant association was also shown by other studies [8, 9, 14, 17]

**Figure-2.** Child Restraint Use according to driver seatbelt use

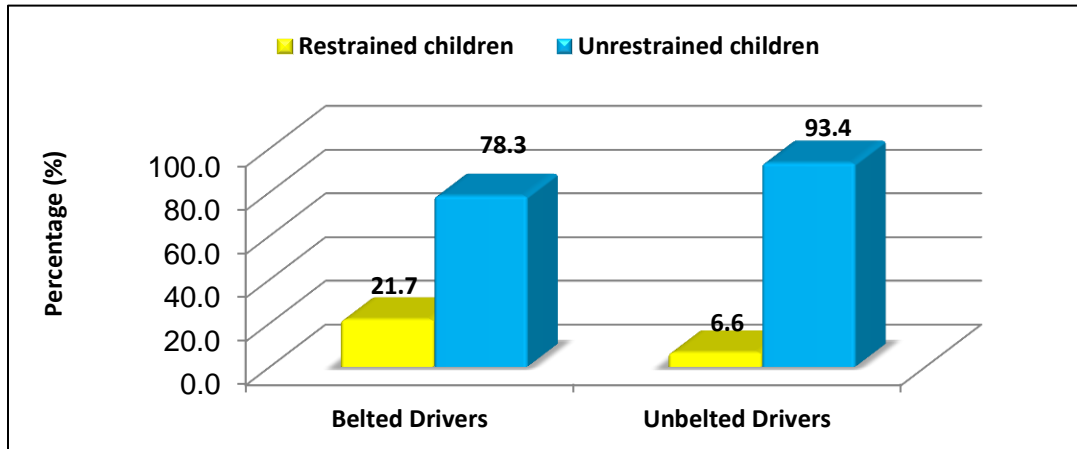
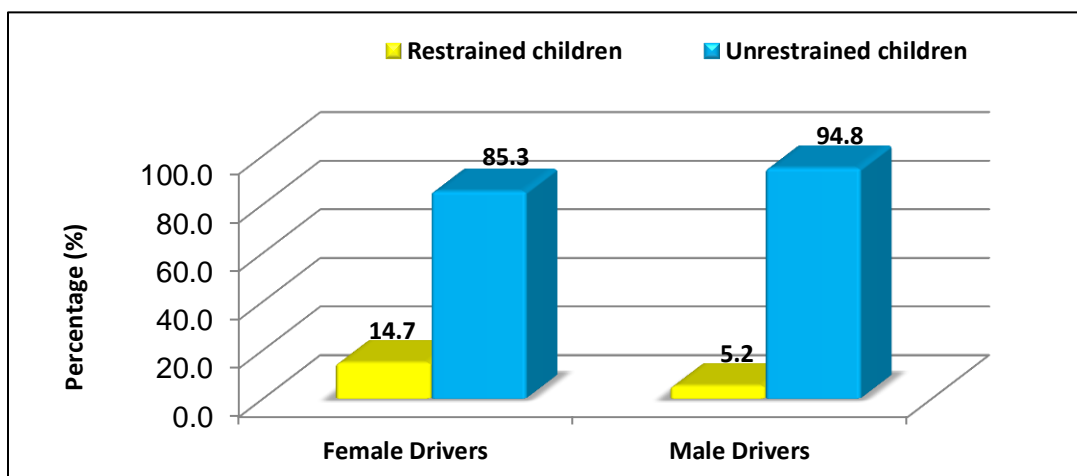


Figure 3 shows the use of child restraint by driver gender. Based on findings, there was a significant association between use of child restraint and driver gender ( $\chi^2(1)=14.059$ , p-value  $<0.0001$ ). This significant association reflects the findings where female drivers ensured that 14.7% of children were restrained compared to male drivers, where only 5.2% of children were restrained. This seems to represent the fact that based on the odds ratio, the odds of child restraint use were 3 times higher if it were a female driver than a male driver (OR=3.169; 95% C.I = 1.690,5.942).

**Figure-3.** Child restraint use according to driver gender



#### 4. DISCUSSION AND CONCLUSION

The overall use of CRS among children travelling to day care centres in the mukim of Kajang is low at 9.5%. This value is similar to a 2007 observational study conducted in the city of Bloemfontein, South Africa, where only 8.8% of children were restrained [9]. The findings however, pale in comparison to those in countries where CRS use is mandatory. 36.1% of the children observed in Maringa, Brazil were using CRS [8]. CRS usage in Australia exceeds 90% [18, 19], while CRS use in the US were above 85% [14]. One of the probable reasons could be to the fact that Malaysia has yet to introduce mandatory use of CRS for children travelling in vehicles. The Malaysian Motorcar (Seat Belts) Rules 1978 stated that the driver and passengers (front and rear) in a motorcar must use the seatbelts. However, there is no mention of specific type of CRS use for children according to their age, height or weight. Enforcement cannot be done when there is no legal requirement to use the CRS. Another probable factor was the selection of observation sites. Observations were done at day care centres which were mostly located in residential areas. While the scope of study did not involve checks of the driving distance between the children home and their daycare centres, casual discussion with the centres operators revealed that most of the children were staying within the same residential area. A study conducted by Hummel, et al. [6], found that one of the reasons given by parents for not restraining their children was that the journey only involved a short distance. Their perception was that crashes are unlikely to occur at low speed zones and short travel distances. Yet, based on crash evidence, a housing area is one of the areas with most crash occurrences [20].

While the numbers were low, it was encouraging to find that there are parents and guardians who took the effort of having their children restrained in vehicles, even in this relatively small sample of the population. Moreover, the observation showed patterns similar to worldwide findings, where CRS use was significantly associated with female drivers [8, 14, 15], belted driver [4, 8, 9, 13], and location of children seated in vehicles. Similar findings were found in a study conducted in Australia [18]. Findings by Lapidus, et al. [21] and National Highway Traffic Safety Administration (NHTSA) [14] showed the opposite; children seated in front were less restrained compared to the ones in the rear. However, attention should be directed to drivers who carried children on their lap while driving. Not only does this pose grave consequences to the child in an event of a crash, the presence of a child on the driver lap interferes with the driving activity itself, contributing to the likelihood of a crash.

This study was conducted only at child day care centres in one of the sub-districts in the country. As such, the findings are unlikely to be representative of the overall CRS use in the country. Similar observations should be done at other sites, such as along roadsides, areas often frequented by children (parks, shopping malls), during different time of the day, different socio economic locations and in other districts in the country. It is necessary to come up with alternative observational study designs to study CRS to achieve findings that are more representative for the entire country.

It is worthwhile to note other limitations of this study. As the study utilised observational method from a distance, it was not possible to determine the proper use of CRS which comprised of proper installation of the CRS, proper restrain of the children, and the appropriate use according to

the child physical size and weight. Taking these limitations into consideration, it is possible that the 9.5% of children observed to be using some form of restraint may not be restrained in an optimal way. Another limitation of this study was observations were made on multiple children in a single vehicle. Clustering was not made in the data analysis.

Initiatives to increase CRS use among children are highly recommended. Pending the introduction of mandatory legislation and the corresponding enforcement, education in the form of awareness campaigns and road shows should be extended to explain the necessity of CRS use. This should include proper use for children and correct installation, as these have been proven to influence the effectiveness of CRS in preventing injuries. These initiatives should begin now, otherwise these innocent children are constantly exposed to high risk of fatalities every time they travel in vehicles unrestrained.

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