

Use of Child Safety Seat and its Determinants in Jeddah, Saudi Arabia: A Cross-sectional Study

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Abstract

Background: A child safety seat protects children from injury during motor vehicle accidents (MVAs). However, there is a lack of enforcement of regulation regarding its use in Saudi Arabia.

Objectives: This study aimed to determine the use of child safety seat and its determinants and barriers in Jeddah, Saudi Arabia.

Materials and Methods: This cross-sectional study was based on a structured face-to-face interview across Jeddah among families who drove in cars with children aged ≤ 5 years. The study used stratified multistage random sampling across the population of the governorate of Jeddah.

Results: A total of 675 parents were included, of which 311 (46.1%) reported having a child safety seat in their vehicle, and only 165 (24.4%) reported its regular use. Awareness levels among parents regarding child safety seat use and its benefits, parents' level of education, family size, family income, and the belief in the need for laws governing child safety seat were key determinants of child safety seat use. Poor awareness among parents regarding the utility of child safety seat in reducing child injuries, low education levels among parents, larger families with multiple children, poor affordability, low family income, and a clear lack of laws mandating the use of child safety seat were identified as key barriers.

Conclusions: The regular use of child safety seat for children aged ≤ 5 years is low in even one of the most urban populations of Saudi Arabia. This indicates the need for large-scale awareness drives and stricter implementation of laws enforcing the use of child safety seat in Saudi Arabia.

Keywords: Barriers, child safety seat, determinants, health behavior, preschool child, prevalence, Saudi Arabia, seat belt, traffic accidents

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Submitted: 30-Jul-2023 **Revised:** 24-Sep-2023 **Accepted:** 14-Feb-2024 **Published:** 05-Apr-2024

INTRODUCTION

Road accidents result in huge medical, social, and economic burden. Globally, motor vehicle accident (MVA) is the ninth leading cause of death across all age groups and is predicted

to become the seventh leading cause of death by 2030.^[1] Saudi Arabia has the highest incidence of deaths caused by MVA in the Gulf and Eastern Mediterranean countries and is

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How to cite this article: Al-Wassia HK, Bokhari OK, Aljahdali MA, Bawazier MA, Basheikh MA, Alsheekh MA, *et al.* Use of child safety seat and its determinants in Jeddah, Saudi Arabia: A cross-sectional study. Saudi J Med Med Sci 2024;12:175-81.

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DOI:

10.4103/sjmm.sjmm_330_23

ranked 24th worldwide.^[1] Further, Saudi Arabia ranks seventh in road accident deaths of children aged ≤ 5 years. Alarming, MVA was the leading cause of mortality in children aged 5–14 years in 2017.^[2] Moreover, MVA was reported to be the most frequent cause of premature death in Saudi Arabia from 2007 to 2017, with a high occurrence of MVA reported in the city of Jeddah.^[3] MVA-related deaths are a growing cause of public concern due to the physical, mental, and financial burden on individuals and families involved.^[4]

Child safety seat (CSS) is designed to protect children from injury or death during vehicle collisions. The Canadian Pediatric Society and American Academy of Pediatrics recommended using CSS in cars carrying children until the age of 13 years. CSS was introduced in 1962, and its use has been mandated by law in several developed countries such as the United States, Canada, and the United Kingdom. Several studies have highlighted the utility and importance of CSS in reducing the odds of experiencing any accident-related injury.^[5] In the United States, a study demonstrated a 29% reduction of MVA-associated injuries in children aged 8–12 years using booster seats.^[6] Another study found that children aged 4–7 years using ‘Belt-Positioning Booster’ seats were 45% less likely to sustain injuries than similarly aged children only using the vehicle seat belt.^[7]

In Saudi Arabia, there is a paucity of studies and data regarding the use of CSS. Alsanea *et al.* reported the prevalence of CSS use in Riyadh to be 18.3% and reported that drivers and passengers rarely use safety measures while driving.^[8] Similarly, a study from Jeddah found that 62.5% of respondents stated that their cars were not equipped with a child restraint system.^[9] To generate recent evidence on the CSS use in urban regions of Saudi Arabia, this study aimed to determine the current prevalence of CSS use and, more importantly, to identify determinants and barriers to CSS use in Jeddah Governorate, Saudi Arabia, which is an urban region.

MATERIALS AND METHODS

The manuscript adheres to the STROBE reporting guidelines for observational studies.

Study design, setting, and participants

This questionnaire-based, cross-sectional study was conducted from June 1, 2019, to June 30, 2020. Eligible study subjects were parents of children aged ≤ 5 years who were visiting primary healthcare centers and private clinics of selected municipalities of the Jeddah Governorate, Saudi Arabia.

Parents’ consent to participate was obtained before administering the questionnaire. Participants were informed that their responses are confidential, accessible only to the research team members, and strictly to be used only for research purposes. The study was approved by the Biomedical Research Ethics Unit at King Abdulaziz University hospital (18/04/2019, 304-19) and the Institutional Review Board of the Directorate of Health Affairs, Jeddah, Saudi Arabia (28/5/2019, 01068).

Data collection

Data were collected through a structured face-to-face interview using an electronic questionnaire by means of a tablet/laptop to enter data. Study team members were trained in administering the questionnaire and entering the survey responses. The questionnaire was adapted from the study conducted by Kakefuda *et al.*^[10] A certified translation office translated the questionnaire into Arabic. The translated version was pilot tested on 10 respondents. The questionnaire responses in Arabic were again translated to English for validation and analysis by the study team. Therefore, the face validity of the questionnaire was confirmed in the pilot assessment (inter-rater agreement Kappa index = 0.9), while the content validity was confirmed by experts in the field. Knowledge-related questions were categorized as correct and incorrect responses. Perceived susceptibility and safety beliefs questions were answered using a 4-point Likert scale, wherein 1 = strongly disagree and 4 = strongly agree.

We used a stratified multistage random sampling from the governorate of Jeddah population. The city of Jeddah is divided into four areas: North, East, Center, and South. The areas cover 19 municipalities in which health service is provided through private and governmental clinics. Two municipalities were randomly selected from each of the four primary areas, followed by a random selection of two districts from each municipality using a random digit generator. An equal number of private and governmental clinics was selected from each district to minimize selection bias.

Sample size

According to the last census (2010), Jeddah had 299,167 children aged ≤ 5 years. The required sample size for this study was calculated to be 615 subjects based on the following factors: The population of interest of children ≤ 5 years, assuming a 99% confidence interval (CI), factoring in the reported percentage of 36.6% parents using CSS in Riyadh and a confidence level of 5%.

Statistical analysis

SPSS for Windows 21.0 (SPSS Inc., Chicago, IL) was used for statistical analysis. Continuous variables were summarized using means and standard deviations (SD) for descriptive statistics and Student's *t*-tests for bivariate analysis. Categorical variables were presented using frequencies and percentages and Chi-square test for bivariate analysis. Logistic regression model was performed to predict the variables that are determinants in predicting non-CSS users. Logistic regression model was performed to predict determinants in non-CSS users. A *P* value of ≤ 0.05 was considered significant.

RESULTS

A total of 710 parents were approached to participate in the study. Of these, 27 were excluded as they were not residents of Jeddah and another 8 because they did not have children aged ≤ 5 years. Therefore, 675 parents who met the inclusion criteria agreed to participate and completed the questionnaire were included in the analysis. A total of 311 (46.1%) had a CSS in their vehicle. Of these, 10 parents did not respond to the question regarding the consistent use of CSS. The actual prevalence of consistent use of the CSS in this study sample was 24.4% (95% CI: 21.2%–27.9%). The prevalence of CSS use was significantly lower among parents who were of older age ($P < 0.0001$, for both mother's and father's age), had lower educational level ($P < 0.0001$, for both parents' education level), and in those with larger families ($P < 0.0001$) [Table 1].

Parents using CSS had significantly higher perceived susceptibility to injury in the absence of a CSS, regardless of driving conditions ($P < 0.0001$). Moreover, parents using CSS reported increased usage of seatbelts, irrespective of their role and position in the car. The CSS users scored higher for the question that adults should behave as role models for children for safety precautions compared with non-users (3.7 and 3.4, respectively). Parents in both groups (CSS users and non-users) thought that child injuries related to road accidents in Saudi Arabia could be reduced by societal efforts, mass awareness campaigns, and educational programs (3.6, 3.3, respectively) [Table 2].

A higher percentage of CSS users were aware of the importance of its use compared with non-users [Figure 1]. Non-users of CSS cited children's resistance to sitting in a CSS as the foremost reason for not using it (68.4%). Sixty-three percent of parents felt it was cruel to force an unwilling child to sit in a CSS, and 68.1% of parents believed that an adult sitting in the car can better take care of a child in the car than the CSS.

Using the logistic regression analysis, it was found that the low education levels of the mother and father (OR: 0.6, 0.8, respectively), mother's older age (OR: 1.1), and bigger family size (OR: 1.8) were significant predictors of not using CSS (Model $P < 0.0001$) [Table 3]. Those who used CSS reported being exposed to significantly more sources of information compared with non-CSS users (61.8% and 38.2%, respectively). The primary sources of CSS related information reported were the internet and medical personnel [Figure 2].

DISCUSSION

This study found that in the Jeddah Governorate of Saudi Arabia, CSS was installed in cars by only 46.1% of parents of children aged ≤ 5 years, and only 24.4% reported its consistent use. A survey from Riyadh conducted in 2018 revealed that only 36.6% of the cars were equipped with CSS, and only half reported appropriate use of CSS.^[8] In the Eastern Province, approximately 50% of parents claimed to use CSS frequently while driving with their children.^[11] Furthermore, a study conducted in Unaizah city in 2018 reported that only 39% of parents use the CSS regularly.^[12] A recent study from Buraidah city found that 40.9% of respondents had CSS available in their vehicles, and only 15.5% used it at all times while driving.^[13] Lastly, a cross-sectional study conducted at Jeddah's well-baby clinics at primary healthcare centers in 2020 reported that 37.5% of participants had a CSS, and only 18.2% used it regularly.^[9]

The use of CSS reported in the current and past studies from Saudi Arabia are slightly higher than those reported from several developing countries. The use of CSS was reported to be 18.7% in Iran,^[14] 22% in Pakistan,^[15] and 50.8% in Brazil.^[16] In contrast, in developed countries such as Australia and the United States, the prevalence of CSS use surpasses 90%.^[17,18] This high prevalence of CSS use is most likely attributable to the strict laws enacted by the governments in these countries, which enforce and ensure that nearly every vehicle that drives a child on board has a CSS installed. This signifies the important role that law enforcement agencies and government bodies can play in increasing the adoption and practice of CSS.

The use of CSS in our sample was significantly higher among families with higher incomes, smaller family sizes, and parents with at least a bachelor's degree. Higher family income has also been associated with a higher prevalence of CSS use in previous studies.^[19,20] In our sample, 38% of participants stated that CSS is expensive, which indicates that affordability and low family income

Table 1: Baseline characteristics of the study subjects

Parameters	Total respondents (n=675), n (%)	CSS users (n=311), n (%)	Non-users (n=364), n (%)	P
Parent				
Father	368 (54.5)	165 (44.8)	203 (55.2)	0.60
Mother	307 (45.5)	146 (47.6)	161 (52.4)	
Age of father (years)				
<30	91 (14.8)	58 (63.7)	33 (36.3)	<0.0001*
30–39	328 (53.3)	159 (48.5)	169 (51.5)	
≥40	196 (31.9)	68 (34.7)	128 (65.3)	
Age of mother (years)				
<30	214 (34.7)	127 (59.3)	87 (40.7)	<0.0001*
30–39	354 (57.4)	144 (40.7)	210 (59.3)	
≥40	49 (7.9)	15 (30.6)	34 (69.4)	
Nationality (father)				
Saudi	420 (62.4)	224 (53.3)	196 (46.7)	<0.0001*
Non-Saudi	253 (37.6)	86 (34.0)	167 (66)	
Father's education				
Primary/intermediate	44 (6.8)	6 (13.6)	38 (86.4)	<0.0001*
High school	180 (27.8)	59 (33.7)	116 (66.3)	
Diploma	55 (8.5)	23 (43.4)	30 (56.6)	
Bachelor	312 (48.1)	169 (57.9)	123 (42.1)	
Master/PhD	57 (8.8)	29 (54.7)	24 (45.3)	
Mother's education				
Primary/intermediate	59 (9.6)	3 (5.10)	56 (16.9)	<0.0001*
High school	181 (29.3)	66 (36.5)	115 (63.5)	
Diploma	41 (6.6)	19 (46.3)	22 (53.7)	
Bachelor	305 (49.4)	179 (58.7)	126 (41.3)	
Master/PhD	31 (5.0)	19 (61.3)	12 (38.7)	
Monthly family income (Saudi Riyals)				
<6000	198 (32.1)	58 (29.3)	140 (42.3)	<0.0001*
6001–10,000	191 (31)	105 (55.0)	86 (45.0)	
10,001–20,000	158 (25.6)	84 (53.2)	74 (46.8)	
20,001–50,000	43 (7)	25 (58.10)	18 (41.9)	
50,001–100,000	11 (1.8)	5 (45.5)	6 (54.5)	
>100,000	16 (2.6)	9 (56.3)	7 (43.8)	
Members in family				
≤5	471 (76.3)	246 (52.2)	225 (47.8)	<0.0001*
6–8	131 (21.2)	37 (28.2)	94 (71.8)	
≥9	15 (2.4)	3 (20.0)	12 (80.0)	
Clinic type				
Public	356 (52.7)	164 (46.1)	192 (53.9)	0.90
Private	319 (47.3)	147 (46.1)	172 (53.9)	

CSS – Child safety seat. *Significant at $P \leq 0.05$

were barriers to CSS use. In previous studies, higher educated parents reported a higher prevalence of CSS use.^[8,12] This corroborates well with the fact that parents with higher education are better exposed to a culture and environment that promotes and implements safety measures. Family size is another factor that plays a role in CSS use. Families with fewer children tend to use CSS more frequently than larger families.^[21] In summary, the level of parent's education, income, and family size impacted the use of CSS in our study, with poorly educated parents, lower income, and larger family size being barriers to CSS use.

The primary sources of CSS related information reported in our study were the internet and medical personnel, which is consistent with findings from the previous study from Jeddah.^[9] In our study, CSS users had higher overall knowledge levels regarding CSS, and thus significantly

higher perceived susceptibility to child injury without CSS as compared with non-CSS users. As expected, non-users had a significant lack of awareness regarding the role of CSS in preventing injuries. Other studies have identified a lack of parental knowledge as a frequent barrier to CSS use.^[22] The CSS users in our study agreed that adults should behave as role models for children about safety precautions. This resonates with findings from previous studies demonstrating that children follow their parent's behavior into adulthood.^[23]

Lack of strict regulations governing the use of CSS has been a major impediment to promoting and adopting the practice of CSS.^[24] In the current study, most non-users of CSS opined in favor of legally mandating the use of CSS and ensuring its enforcement through government agencies. Therefore, a regulatory framework on the use of CSS by the government's policymakers may increase its use

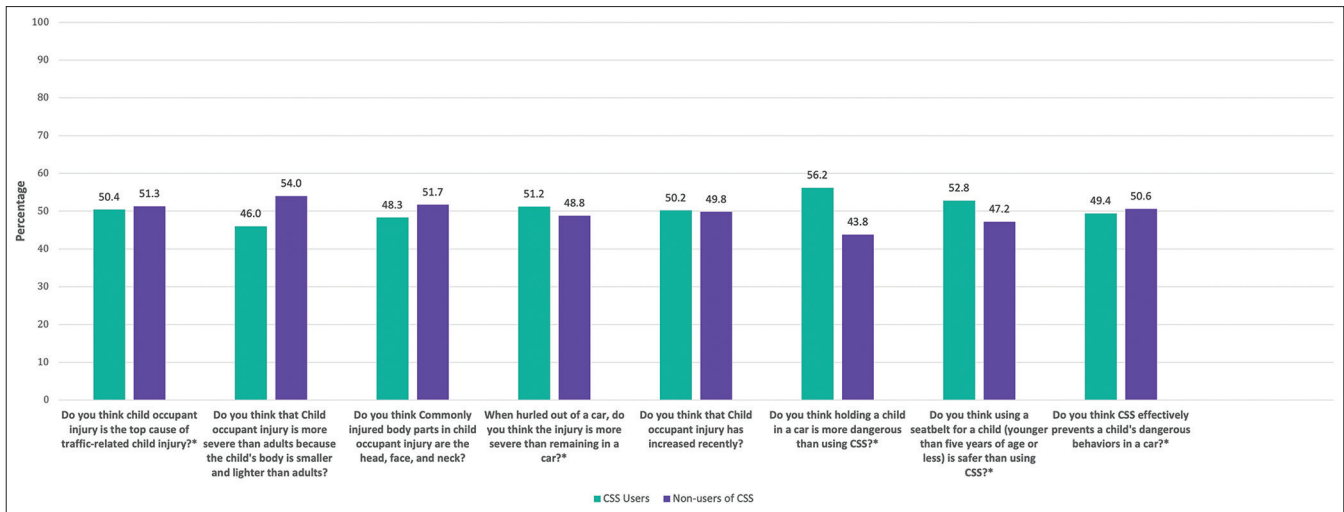


Figure 1: Comparison of knowledge levels between child safety seat users versus non-users (percentage of correct answers). *Statistically significant difference using *t*-test. CSS: Child safety seat

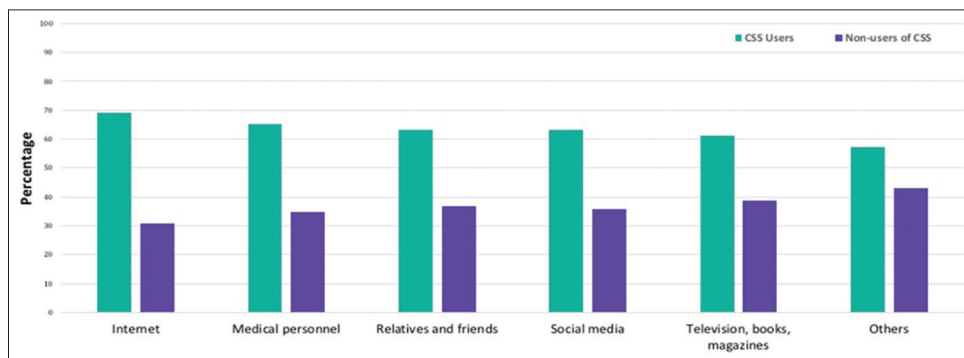


Figure 2: Comparison of the sources of information about child safety seat (CSS) between users and non-users of CSS. CSS: Child safety seat

Table 2: Comparison of the rating between users and non-users regarding child safety seat using a 4-point Likert scale

Parameter	Mean±SD		P
	CSS users	Non-users	
Perceived susceptibility of child injury without CSS			
When driving unsafely	3.4±0.7	3.2±0.7	<0.0001
When driving safely	2.6±0.8	2.3±0.8	<0.0001
When stopping at a signal	3.1±0.7	2.7±0.8	<0.0001
Perceived severity of child occupant injury without CSS			
During car accident	3.2±0.9	2.9±0.8	0.001
When driving safely	2.2±0.9	1.9±0.7	<0.0001
When stopping at a signal	2.5±0.9	2.3±0.8	0.001
Self-efficacy			
Setting up CSS properly in a car	3.2±0.8	2.7±0.8	<0.0001
Making a child sit in CSS even when they do not want to sit	2.4±0.9	1.9±0.9	<0.0001
Subjective norm			
Spouse: Perceived norm	3.5±0.6	2.7±0.8	<0.0001
Safety value and belief in injury preventability			
Adults should behave as role models of safety for children	3.7±0.6	3.4±0.6	<0.0001
Safety rules cannot be negotiable with children	3.3±0.8	3.1±0.8	<0.0001
Societal efforts can reduce child injury deaths in KSA	3.6±0.6	3.3±0.7	0.001
Child injury prevention campaigns and educations are enough	3.5±0.6	3.3±0.7	<0.0001
Law enforcement efforts by traffic police department in using CSS are enough	1.7±0.9	2.0±0.9	<0.0001
Parent seatbelt usage			
Use of driver's seatbelt (if the parent drives)	4.9±0.6	4.8±0.6	0.40
Use of front passenger seatbelt	4.5±0.9	4.3±1.1	0.001
Use of rear passenger seatbelt	2.5±1.4	2.2±1.3	0.004

CSS – Child safety seat; KSA – Kingdom of Saudi Arabia; SD – Standard deviation

Table 3: Logistic regression analysis predicting child safety seat non-users

Variable	Adjusted OR	OR 95% CI	P
Mother's age	1.1	1.0–1.1	0.0001*
Mother's Education	0.6	0.6–0.7	0.0001*
Father's Education	0.8	0.7–0.9	0.01*
Size of family (member)	1.8	1.2–2.8	0.004*

*Statistically significant, OR=Odds ratio, CI=Confidence interval.
Hosmer–Lemeshow test $P=0.7$, $R^2=22\%$, Model $P<0.0001$

in Saudi Arabia, and thus reduce MVA-related child injuries. However, legislation alone may be insufficient to result in general acceptance and behavioral change. In our study, CSS users were more aware and better informed than non-users. Past evidence has shown that large-scale social campaigns and mass awareness drives can drastically improve the use of booster seats.^[25] Therefore, there is need for large awareness drives aimed at a societal level to inform people regarding the utility of CSS and to encourage its mass implementation.

Strengths and limitations

The stratified multistage random sampling technique minimized selection bias in our sample and gave a good representation of different sociodemographic areas in the city. The sample size was based on the latest estimate of the population of interest and the reported prevalence of CSS use in our region, thereby minimizing random error and the role of chance. Further, the data collectors were trained, and the questionnaire was administered in person to reduce the effect of information bias.

However, our study was conducted in primary healthcare centers and pediatric clinics, where visitors are healthcare seekers. They represent a medically and socially aware cohort; therefore, this could have led to some degree of over-representation of CSS users in our study. In addition, Jeddah is an urban city where the prevalence and determinants of CSS use might not reflect the reality in other rural and suburban parts of the country.

CONCLUSIONS

This study found that even in an urban area such as Jeddah, less than a quarter of the parents of children aged ≤ 5 years used CSS. Awareness levels of parents regarding the use and benefits of CSS, their level of education, family size, and family income were determinants of CSS. The study also found that non-users would likely adopt the use of CSS if there was an enforcement by law. These findings highlight the need for the country's policymakers to form strict laws enforcing the mass use of CSS and to carry out large-scale awareness drives to educate and encourage the masses to adopt the use of CSS to prevent MVA-related injuries.

Ethical considerations

The study was approved by the Biomedical Research Ethics Unit at King Abdulaziz University hospital (Ref. no.: 304-19; date: April 18, 2019) and the Institutional Review Board of the Directorate of Health Affairs, Jeddah, Saudi Arabia (Ref. no.: 01068; date: May 28, 2019). All study participants provided written consent before inclusion in the study. The study adhered to the principles of the Declaration of Helsinki, 2013.

Peer review

This article was peer-reviewed by two independent and anonymous reviewers.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author contributions

Conceptualization: H.K.A-W, O.K.B, M.A.J, M.A.B, M.A.A., Y.T.A, M.N.H, and D.E.M; Methodology: H.K.A-W, O.K.B, M.A.J, M.A.B, M.A.A., Y.T.A, M.N.H, M.Y.B, D.E.M; Data analysis: D.E.M; Writing—original draft preparation: H.K.A-W, O.K.B, M.A.J, M.A.B, M.A.A., Y.T.A, M.N.H, and D.E.M; Writing – review and editing: H.K.A-W, M.Y.B, and D.E.M; Supervision: H.K.A-W and D. E. M.

All authors have read and agreed to the published version of the manuscript.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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