

Frequency and Determinants of Usage of Child Car Seats among Parents of Kindergarten and Primary Schools in Makkah Al Mukarramah City In 2023

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ABSTRACT

Child car seats (CCS) play a crucial role in ensuring the safety of children during motor vehicle crashes (MVCs). In Saudi Arabia, the utilization of CCS faces significant challenges, resulting in substantial negative impacts on disability-adjusted life-years. Despite the presence of mandatory regulations, the effective implementation of CCS remains inadequate. This deficiency is attributed to a lack of awareness and the absence of standardized national guidelines. This study aims to assess the frequency of CCS usage and the influencing factors in Makkah Al Mukarramah, Saudi Arabia, with a focus on addressing this pressing safety concern. **Methodology:** This cross-sectional study is conducted in Makkah Al Mukarramah and utilized a multistage random sampling technique for the selection of schools and classes. Data collection involved an Arabic questionnaire developed by the authors and adapted from previously validated research studies. Electronic survey was employed for data collection, and subsequent analysis was carried out using IBM SPSS version 29. **Results:** The study investigated the utilization of child car seats among 374 parents in Makkah Al Mukarramah. Most of the respondents were female (60.4%), aged between 21 and 40 years (59.4%), and held bachelor's degrees (50.8%). The prevalence of car seat usage was 50%, with mothers being the primary users in most cases (50.3%). Gender, age, and education were found to significantly impact usage ($p < 0.05$). Factors related to knowledge exhibited varied effects on child safety. However, regression analysis revealed no significant correlations between car seat usage and parental knowledge concerning child safety and well-being. **Conclusion:** Our study offers valuable insights into the patterns of child car seat usage among parents in Makkah, Saudi Arabia. It highlights how sociodemographic factors and parental perspectives play a pivotal role in influencing the adoption of CCS. These outcomes underscore the urgency for enhanced safety programs and policies concerning child car seat usage. Moreover, it is strongly recommended to conduct further research to gain a deeper understanding of the other factors influencing this issue. This expanded exploration will lead to a more thorough comprehension, subsequently facilitating the creation of suitable action plans specifically tailored to the unique context.

KEYWORDS: child car seats, parents, child safety, disability, motor car accidents.

1. Introduction

Child car seats (CCS) are designed to protect children from injury during motor vehicle crashes (MVC). There are many types of CCS such as: Rearward-facing restraints, Front-facing restraints, and booster Seats. Studies have found the importance of using car seats and their effectiveness in reducing the risk of injury and death of 54% in young children ^[1,2].

Although car seats for children have received considerable attention in recent years, they are considered responsible for the greatest loss of disability adjusted life years in Saudi Arabia ^[3]. Low educational attainment affects parents' behavior regarding the non-use of a child car seat ^[4]. According to the Institute for Health Metrics and Evaluation, MVC alone account for 7.6% of the total deaths reported in all age groups in Saudi Arabia, and the estimated mortality rate of children less than 5 years of age was 4.09 per 100,000^[5].

Although the law of Saudi Arabia requires the use of car seats mandatory, however there is no implementation of that order ^[6]. Moreover, there is no national data to illustrate the prevalence of CCS use in Makkah Al Mukkaramah, Saudi Arabia according to the Literature review, and there are no national specifications in terms of age, weight, and height to ensure children are using the appropriate seats.

▪ Rational Of the Study:

Studies concerning this public health issue are rare. By conducting this study, we will be able to recommend solutions to reduce morbidity and mortality among children. The objective is to estimate the frequency and find out the determinants of CCS use in Makkah Al Mukkaramah, Saudi Arabia.

▪ Aims:

- General aim: to evaluate the prevalence of usage of child car seats

▪ Objectives:

-To estimate frequency of using child car seats among children enrolled in kindergartens and primary schools in Makkah city, Saudi Arabia, in 2023.

-To identify determinants of using child car seats in kindergartens and primary school city, Saudi Arabia, in 2023.

2. Methodology

▪ The Study Design of this research is cross-sectional.

▪ The Study Population and Eligibility Inclusion Criteria: parents of all children enrolled in kindergartens, first three years of girls` and boys` primary schools in Makkah Al Mukarramah city will be eligible for study inclusion provided they have the inclusion criteria (Appendix 1). Parents including (father or mother), or any person who is legally responsible for the care of the child and who currently provides care to the child.

Appendix 1:

	Girls		Boys	
	No. of schools	No. of students	No. of schools	No. of students
Kindergarten				
-Governmental	107	5724	107	5724
-Private	64	743	64	743
Primary schools*				
-Governmental	262	45436	264	44284
-Private	45	2001	31	3204

*Number of students in the first three levels

- The Study Area (city, services, and study location)

This study will be done in Makkah Al Mukarramah city among kindergarten and primary school children enrolled in the Academic year 2022-2023. Makkah is considered a holy city for Muslim, contain the most sacred places such as the Islamic Kaaba and The Holy Mosque. This city is urban and has government services such as health, education, electricity, municipality, and transportation. Education services in Saudi Arabia are classified into governmental, private, and foreign education, which is subdivided into general and special-needs education. Levels are distributed between early childhood education in kindergarten stages and primary, intermediate, and secondary stages. The education department in Makkah city is distributed among main offices incorporating the north, south, east, west and central office as well as the office of private and foreign education. In Makkah, there are 264 governmental primary schools and 31 private schools for boys and 324 for girls and 184 kindergartens.

- The Sample Size:

The total population of this study is 136,699 children enrolled in kindergartens and first three years of primary schools (governmental and private) of both genders. The minimum required sample size was calculated using Rao soft software at 95% confidence level (CI) and 5% margin of error and assuming the prevalence of child car seat CCS use to be 50%. Accordingly, the required sample size was 374 parents/caregivers. An additional 10% will be considered to compensate for possible none or incomplete response.

- The Sampling Technique:

Multistage random sampling technique will be adopted in this study.

-In the first stage, two geographical educational areas in Makkah will be chosen by simple random technique

-In the second stage, two governmental kindergartens and 2 governmental primary schools for boys and two for females will be chosen through a simple random technique. Thus, 4 kindergartens, 4 primary schools for boys and 4 primary schools for girls will be chosen. One private kindergarten, one primary school for boys and one for females will be also chosen to represent the private sector.

-In the third stage, one class will be selected from each school representing kindergarten and the first three years of primary school students will be chosen.

Thus, a total of 4 governmental and one private kindergarten classes, 12 governmental and 3 private boys primary school classes (4 for each of years 1-3) and 12 governmental and 3 private girl's primary school classes will be chosen

-In the last stage the sample will be distributed on the chosen classes and a simple random technique will be adopted to select students from each class.

- **Data Collection Tools:**

An Arabic self-administered questionnaire will be utilized in this study. It has been previously adopted and validated in a Saudi study conducted in Riyadh [7]. Permission to utilize the questionnaire requested from the corresponding author through personal communication. It consists of three main sections: First section concerned with socio-demographic data and general information about the participants who are filling the questionnaire (age, gender, relationship to the child, family member number, family member number less than 5 years and family income). The second section assessed the safety practice, including using safety belts and the application of Child restraint system CRS. The last section assessed the perception of Child restraint system (CRS) on a five-point Likert scale (strongly disagree, disagree, neutral, agree, and strongly agree) with three reverse-worded questions.

- **Data Collection Technique:**

An electronic questionnaire will be distributed among the student parents of the selected schools by their teachers through what's app. The informed consent will be in the first part of the questionnaire, and they will have the willingness to accept or refuse participation. The questionnaire comprises 8 questions on safety practices, and perception of CCS. We used a five-point Likert scale for car seats (never, rarely, sometimes, often, and always) for children. We used a five-point Likert scale (strongly disagree, disagree, neutral, agree, and strongly agree) to assess respondents' perceptions of car seat. Data collection will be started after approval from Directors of the involved kindergarten and governmental primary schools.

- **Study Variables:**

1. Dependent variable: Usage of CCS (Yes / No)
2. Independent variable: age, gender, nationality, education, occupation, and income

- **Data Entry and Analysis:**

All statistical analyses will be conducted using IBM SPSS Statistics, version 29, Descriptive statistics will be reported as frequencies with percentages, and mean with standard deviation. For inferential statistics, the Chi-Square test, will be used as appropriate to determine significant statistical difference of categorical variables. A significant difference at a P value less than 0.05 will be accepted.

- **Ethical Considerations:**

1. Written permission from Joint Program of Preventive Medicine, Makkah Region will be obtained before conducting the research.

2. Written permission from the ministry of education will be obtained.
3. Verbal informed consent the directors of the involved kindergarten and governmental primary schools will be obtained.
4. Verbal informed consent will be requested from all the participants.
5. All information will be kept confidential and will not be accessed except for the purpose of scientific research.

- Expectation:

After this study, we are expected to answer the research question and estimate the frequency of the usage of the Child Car Seats (CCS), and frequency related to usage, and recommend solution to decrease morbidity and mortality due to non usage of CCS

- Budget, Fund or Grant:

self-funded

3. Results

Our study “Frequency and determinants of usage of child car seats among parents of kindergarten and primary schools in Makkah Al Mukarramah city in 2023” included 374 parents. The majority of respondents were female (60.4%) compared to male (39.6%). Most fell within the age range of 21-40 years (59.4%), with a smaller percentage in the 41-60 years range (34.0%). The majority of respondents were husbands/wives (84.0%), followed by those with other relations (12.3%) and those separated/divorced (3.7%). In terms of educational status, the largest group held a bachelor's degree (50.8%), followed by high school graduates (20.6%). Mothers (50.3%) and fathers (32.1%) were the primary caregivers. Family size predominantly fell within 3-5 members (50.0%), and a substantial number had 1 family member under 10 years of age (30.2%). Monthly income varied, with the highest percentage in the < 5000 SAR range (34.2%). The majority always used seatbelts (64.2%), while a small percentage did not use them (4.5%) and others used them often (31.3%).

Table 1: Parental Sociodemographic characteristics and Child Car Seat Usage (n=374)

		Frequency (n)	Percent (%)
Gender	Female	226	60.4
	Male	148	39.6
Age	< 20 Years	16	4.3
	21-40 Years	222	59.4
	41-60 Years	127	34.0
	>60 Years	9	2.4
Marital Status	Husband/Wife	314	84.0
	Other	46	12.3
	Separated / Divorced	14	3.7
	Less than high school	62	16.6

Frequency and Determinants of Usage of Child Car Seats among Parents of Kindergarten and Primary Schools
in Makkah Al Mukarramah City In 2023

Educational Status	High school	77	20.6
	Bachelors.	190	50.8
	Postgraduate	45	12.0
Kinship	Mother	188	50.3
	Father	120	32.1
	Brother/Sister	25	6.7
	Grandparents	15	4.0
	Aunt	12	3.2
	Others	14	3.7
No. of Family Members	2 or < 2	19	5.1
	3-5	187	50.0
	6-9	154	41.2
	10 Or > 10	14	3.7
Family Members with < 10 Years of Age	No	49	13.1
	One	113	30.2
	Two	110	29.4
	Three	68	18.2
	Four or Greater	34	9.1
Monthly Income	< 5000 SAR	128	34.2
	5000 to 9999 SAR	87	23.3
	10000 to 14999 SAR	57	15.2
	15000 to 20000 SAR	70	18.7
	>20000 SAR	32	8.6
Use Your Seatbelts	Always	240	64.2
	I do not use it	17	4.5
	Often	117	31.3

n: frequency, %: percentage

Table 2 shows child car seat usage by parents and protection from road traffic accidents (RTA). Out of 374 patents, only 148 have Child's Seats in their cars. Of these, 50% always used Child seats, 25% used them most of the time, and 18.2% used them Sometimes. Regarding the age of 1st child using car seats: (35.8%) of them 1 Y/o, while (29.1%) 2 Y/o, and (8.8%) were 3 Y/o. Regarding the Gender of 1st child: Females were (51.4%) and Males were (48.6%). Further is shown in Table 2. Out of total parents, 100 ever met RTA, so in that case most common protection method were Car seat belt (49%), followed by Car seat for children (48%), and Other (3%). Out of them, most had no injuries (70%) while some had Minor cuts or bruises (15%), Fractures (5%), Critical injury (1%).

Table 2: Frequency of Kindergarten & Primary School Child Car Seat Usage and Road Traffic Accident Protection (n=148)

		Frequency (n)	Percent (%)
Currently have a child seat in your Car	Yes	148	-
How often you used Child Car Seat	Always	74	50.0
	Most of the time	37	25.0
	Scarcely	6	4.1
	Sometimes	27	18.2
Age of 1 st child, who Use Car Seat	1	53	35.8
	2	43	29.1
	3	13	8.8
	4	15	10.1
	5 or > 5	23	15.5
Gender of 1 st Child	Female	76	51.4

	Male	72	48.6
Age of 2 nd child, who Use Car Seat	No 2 nd Child	51	34.5
	1	30	20.3
	2	17	11.5
	3	10	6.8
	4	8	5.4
	5 or > 5	10	7.9
Gender of 2 nd Child	Female	41	27.7
	Male	48	32.4
Age of 3 rd child, who Use Car Seat	1	28	18.9
	2	13	8.8
	3 or > 3	15	27.7
Gender of 3 rd Child	Female	34	23.0
	Male	32	21.6
		Frequency (n=100)	Percent
Have you ever met RTA with Child	Yes	100	-
How You Protected Your Child	Car seat belt.	49	49%
	Car Seat for children.	48	48%
	Other	3	3%
Injuries to Child During Accidents	No Injuries	79	70%
	Minor Cuts or Bruises	15	15%
	Fractures	5	5%
	Critical injury (ICU)	1	1%

n: frequency, %: percentage

Figure 1 shows how children sit in cars without child seats. When the mother or a representative is present, 25% of the time the child sits with them, followed by the child sitting on the front passenger's lap (14.5%), and the child in the back seat using a seat belt (12.2%).

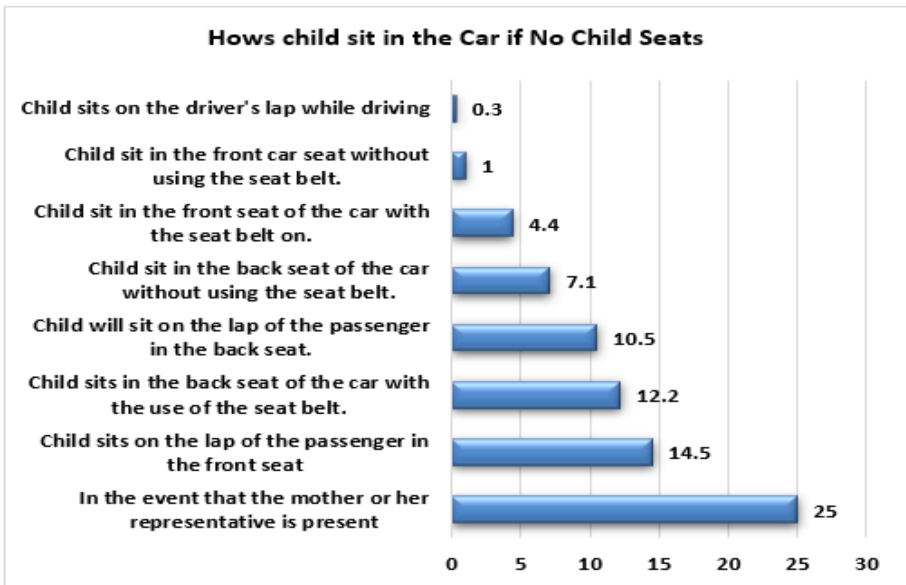


Figure 1: How's a child sit in Car if No Child Seats

Most parents had sufficient information about child seatbelts (70.3%). They considered child car seats as vital for child protection during travel (85.0%) and disagree that child seats are only important at high speeds (64.4%). A substantial number disagree that child seats are unnecessary for children >2 years (59.4%) or expensive (27.0%) (Table 3).

Table 3: Parents' information about Child Seats (n=374)

		Frequency (n)	Percent (%)
Enough Information about Child's Car Seatbelt	Agree	263	70.3
	Neutral	74	19.8
	Disagree	37	9.9
Child's Car Seat is Essential part of Child Protection during Travelling	Agree	318	85.0
	Neutral	36	9.6
	Disagree	20	5.3
Child's Seat is important only when Driver driving at high speed	Agree	108	28.9
	Neutral	25	6.7
	Disagree	241	64.4
Child Seats are not important for > 2 Years Child	Agree	73	19.5
	Neutral	79	21.1
	Disagree	222	59.4
Child Seats are Expensive	Agree	171	45.7
	Neutral	102	27.3
	Disagree	101	27.0

n: frequency, %: percentage

Table 4 shows sociodemographic factors related to the utilization of child car seats among parents. Significant associations are evident between gender and car seat usage, with more females (105) using child seats compared to males (43) ($p < 0.001$). Age is also significant, with no participants under 20 using child seats while a maximum (108) parents use car seats significantly in the age group of 21-40 ($p < 0.001$). Education plays a significant role with higher usage among those with higher educational levels bachelor (84) & post-graduate (25) ($p < 0.001$). Maternal status of parents and family size didn't show a significant association with the use of car seats. Families with less than 10 years of family members (1, 2, or 3 members) tend to use car seats more ($p < 0.001$). Monthly income displays variations in usage across income ranges, with higher usage among those earning 5000 to 9999 SAR (43) ($p = 0.003$).

Table 4: Sociodemographic features of parents associated with the usage of Child Car Seats (n=374)

Variable		Usage of Child's Car seats		Sig. Value
		No	Yes	
Gender	Female	121	105	<0.001
	Male	105	43	
Age	< 20 Years	16	0	<0.001
	21-40 Years	114	108	
	41-60 Years	90	37	
	>60 Years	6	3	
Educational Status	Less than high school	50	12	<0.001
	high school	50	27	
	Bachelors	106	84	

	Postgraduate	20	25	
Kinship	Mother	100	88	0.006
	Father	85	35	
	Brother/Sister	20	5	
	Grandparents	6	9	
	Aunt	7	5	
	Others	8	6	
Marital Status	husband/wife	185	129	0.263
	Other	30	16	
	Separated / Divorced	11	3	
No. of Family Members	2 or < 2	9	10	0.129
	3-5	105	82	
	6-9	102	52	
	10 Or > 10	10	4	
Less than 10 Years Family Members	No	46	3	<0.001
	One	64	49	
	Two	63	47	
	Three	36	32	
	Four or Greater	17	17	
Monthly Income	< 5000 SAR	91	37	0.003
	5000 to 9999 SAR	44	43	
	10000 to 14999 SAR	26	31	
	15000 to 20000 SAR	43	27	

n: frequency, %: percentage

Table 5 shows regression analysis results related to car seat usage prevalence and parental knowledge factors predicting child safety and well-being. The prevalence of car seat usage is positively associated with child safety but this relation is non-significant as (B=0.483, Sig=0.391, Exp(B)=1.620, 95% CI: 0.53-4.87). Parents' knowledge factors show mixed associations: Enough Information about Child's Car Seatbelt negatively impacts the child safety (B=-0.475, Sig=0.159, Exp(B)=0.622, 95% CI: 0.32-1.20), while the belief that Child's Car Seat is Essential positively relates to their child safety (B=0.279, Sig=0.518, Exp(B)=1.322, 95% CI: 0.56-3.07). Disagreeing that Child's Seat is important only at high speed positively influences their child safety (B=0.486, Sig=0.053, Exp(B)=1.626, 95% CI: 0.99-2.65). Disagreeing that Child Seats are not important for > 2 Years Child has a minor positive impact on their child safety (B=0.147, Sig=0.630, Exp(B)=1.159, 95% CI: 0.63-2.10). The belief that Child Seats are Expensive positively correlates with their child safety (B=0.453, Sig=0.144, Exp(B)=1.573, 95% CI: 0.85-2.88). But all these variables show a non-significant relationship with the child's safety and well-being.

Table 5: Prevalence of Car Seat Usage and Parental Knowledge Factors Predicting Child Safety (n=374)

	OR	Sig.	Exp(B) (95% CI)
Prevalence of Car Seat Usage			
Currently, Use a child seat in your Car	.483	.391	1.620 (0.53-4.87)
Knowledge of Parents about Child Car Seats			
Enough Information about Child's Car Seatbelt (Agree)	-.475	.159	.622 (0.32-1.20)
Child's Car Seat is Essential part of Child Protection during Travelling (Agree)	.279	.518	1.322 (0.56-3.07)

Child's Seat is important only when Driver driving at high speed (Disagree)	.486	.053	1.626 (0.99-2.65)
Child Seats are not important for > 2 Years Child (Disagree)	.147	.630	1.159 (0.63-2.10)
Child Seats are Expensive (Agree)	.453	.144	1.573 (0.85-2.88)
Constant	-.152	.906	.859

OR: odds ratio, CI: Confidence Interval, exp B: exponential value of B

4. Discussion

Our study investigated the child car seat usage among parents of kindergarten and primary school children in Makkah Al Mukarramah city in 2023 and yield multifaceted insights with broad implications for child safety, public health, and policy considerations. The ensuing discussion delves into the nuanced relationships revealed by the study's results, highlighting their significance, limitations, and potential avenues for further exploration.

The sociodemographic features unveiled in the study's findings underscore the pivotal role of gender in shaping child car seat usage patterns. The higher prevalence of female parents utilizing child seats reflects both cultural norms and a heightened sense of maternal responsibility (8). This gendered discrepancy can guide targeted educational campaigns to ensure that fathers and male caregivers are equally informed and engaged in child safety practices. The pronounced adoption of child car seats among parents aged 21-40 years corresponds with a life stage marked by increased parental awareness and responsibilities (9). Interestingly, marital status did not significantly influence car seat usage, implying that child safety transcends relationship statuses. The strong association between higher education and increased car seat usage echoes findings from previous studies, reinforcing the role of education in fostering awareness(10, 11).

The patterns of child car seat usage and protection against road traffic accidents (RTA), underscore the pressing need for targeted educational campaigns. The considerable percentage of parents not utilizing child car seats signifies the persistence of gaps in knowledge or attitudes toward child safety. This finding is congruent with the existing literature that emphasizes the importance of tailored interventions to address these gaps(12). The trend of initiating car seat usage at one year old indicates growing awareness of early child safety measures, aligning with recommendations from various safety organizations(13). The equitable distribution of gender among children using car seats suggests that gender-based stereotypes are gradually being challenged, contributing to a more inclusive approach to child.

Parental knowledge and perceptions reveal both areas of strength and potential misconceptions. The widespread understanding of the importance of child car seats as a protective measure attest to the success of existing awareness campaigns (14). However, misconceptions such as the belief that child seats are exclusively relevant at high speeds indicate the need for nuanced education strategies that address common myths. The debate over the necessity of child seats for children beyond the age of 2 underscores the importance of precise communication to dismantle

unfounded beliefs (15). Additionally, the perception of child seats being expensive presents an opportunity to explore subsidies or incentives to bridge economic barriers, thereby enhancing accessibility (16).

Relationship between sociodemographic factors and child car seat usage shows that the gender disparity in usage reaffirms the need to tailor campaigns to cater to specific gender roles and perceptions. Gender emerges as a critical determinant, with females exhibiting higher usage rates. This aligns with social norms that females as caregivers and nurturers, influencing safety-conscious behaviors(16, 17). The prevalence of child car seat usage among parents aged 21-40 underscores the potential impact of targeted educational interventions during this life stage. The correlation between higher educational levels and increased child car seat usage accentuates the role of education in reshaping attitudes and behaviors. Notably, family size and the presence of young family members under 10 significantly influence usage, suggesting that parents with younger children prioritize safety measures.

Regression analysis reveals the intricate interplay between parental knowledge and safety outcomes. The non-significant relationship between car seat usage prevalence and child safety is a noteworthy finding that prompts further exploration into the underlying factors contributing to safety outcomes. The positive correlation between the belief in the essential nature of child car seats and child safety underscores the power of parental attitudes in shaping behaviors (18). Conversely, the nuanced impact of knowledge about child seatbelts on usage invites scrutiny into the interplay between information saturation and practical application.

5. Conclusion

Our study offers comprehensive insights into child car seat usage among parents of kindergarten and primary school children in Makkah Al Mukarramah city. The findings underscore the significance of sociodemographic factors, parental knowledge, and perceptions in shaping usage patterns and safety outcomes. These findings hold profound implications for public health campaigns, educational initiatives, and policy considerations aimed at enhancing child safety on the roads. Future research endeavors should delve deeper into the complexities underlying the relationships identified in this study, fostering a deeper understanding of the dynamics that shape child car seat usage behaviors and safety outcomes.

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