

# Seat belt use on transportation buses for hajj 1438 – (2017)

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## Abstract

**Background:** In Saudi Arabia, there were approximately 526,000 vehicle crashes in 2016 causing 39,000 injuries, with up to 17 deaths per day [8]. In Islam all Hajj pilgrims must enter Makkah by road [1]. Tour buses are the most used method of transportation, with more than 24,000 tour buses carrying pilgrims to Makkah. Passengers are assigned to buses based on country of residence. Seat belt use is mandatory in Saudi Arabia by law, but little is known about compliance during Hajj.

**Methods:** During the 2017 Hajj we completed an observational study on seat belt use among pilgrims and bus drivers. We also observed police behavior at check points for enforcing seat belt use on bus drivers and passengers. To describe and identify any differences in seat belt use, we sought a diverse sample of buses with passengers of different socioeconomic status and from different countries.

**Results:** We observed seat belt use on 40 buses carrying 41- 49 passengers each. Five (12.5%) buses out of 40 had at least one passenger using seat belt. Females (54%) had higher seat belt use than males (47.9%). All 40 (100%) bus drivers were observed to wear seat belts. No drivers or police were observed to encourage passengers to use seat belts. We found no difference in seat belt use between Saudi national passengers of different socioeconomic status: none wore seat belt. Seat belt use among developed countries (51.1%) was higher than underdeveloped countries (0%) and still developing countries (0%).

**Conclusion:** Despite mandatory seat belt use in Saudi Arabia, seat belt use among Hajj pilgrims was low. Saudi Arabia has a high rate of injuries due to vehicle crashes, and seat belts are an effective way to reduce injuries. Public awareness of the benefits of seat belts and strong enforcement of seat belt use will reduce injuries from vehicle crashes.

## 1. Introduction:

The Annual Islamic event, Hajj, takes place in Makkah (the most holy city for all Muslims). Hajj is the fifth pillar of Islam [1]. On average over 2 million pilgrims travel to perform Hajj every year [2]. This year the number of pilgrims is expected to reach 3 million. The majority of Hajj pilgrims arrive to Saudi Arabia by air (94%), by land (5%), and by sea (1%), as seen in Figure 1 [11]. Despite the method of transportation used by pilgrims to arrive to Saudi Arabia, in Islamic rules all Hajj pilgrims must enter Makkah by road. Therefore, the majority of pilgrims will travel on a tour bus for at least a portion of their journey. Tour buses equipped with safety belts are the safest design for long distance travel, and highway travel at high speeds. School buses, usually not equipped with safety belts are made for short distance, and slower speed travel. Unfortunately, both types of buses have been used previously for transportation of pilgrims.

## 2. Research Aims:

- A. To assess the availability of tour buses with seat belts.
- B. To assess the usage of seat belts among pilgrims riding buses into and out of Makkah.
- C. To assess the police enforcement of seat belt laws.

## 3. Research Methodology:

An observational study was conducted to identify seat belt use by pilgrims on buses. Observations will also be noted as to police enforcement at checkpoints and the drivers' or group leaders' encouragement of seat belt usage. The study conductor walked the aisle of each bus and observed each pilgrim to determine seatbelt usage. The observational study on 40 buses was conducted. 10 buses were observed in the Eastern Province at specific bus stations belonging to specific Hajj agencies. These observations began from their start point on day 5 and day 6 of Dhu al-Hajjah specifically on buses carrying pilgrims traveling to Makkah. The study continued with observations on 15 buses in Makkah at the bus station (Tafweej Center), during day 12 and day 13 of Dhu al-Hajjah for pilgrims traveling to Madinah. The study concludes after observations were conducted on 15 busses in Makkah at the bus station during day 14 to day 15 of Dhu al-Hajjah for pilgrims traveling to Jeddah Airport.

The study consisted of three different groups. **Group 1** contained local Saudi national pilgrims who were traveling from the Eastern Province to Makkah. 10 randomized buses were selected, selection was based on obtaining data from three types of socioeconomics;

high socioeconomic class AKA VIP class, average socioeconomic class AKA Average class, and low socioeconomic class AKA Low Income class. **Group 2** consisted of International pilgrims who completed Hajj and were visiting the second holy city, Madinah. The observations were conducted on 15 randomized buses. **Group 3** was also consisted of International pilgrims who completed Hajj and were ready to go back to their countries from Jeddah Airport. Targeted observation of 15 selectively randomized buses based on the following criteria; developed countries, developing countries, and underdeveloped countries. The total sample size for this study was 1896 pilgrims.

The primary investigator collected all data points for each bus, data points collected were seat belt usage on buses by pilgrims, driver seat belt usage, directions to passengers, and traffic police enforcement of seat belt laws. All data was documented in details.

After the observation period was complete, all data was entered into the Epi Info 7 software and Microsoft Excel for analysis.

This study was conducted under the supervision of Dr. Sami Almudarra, Director of FETP, and Dr. Joanna Gaines from USA C.D.C.

#### **4. Results and Discussion:**

**Results:** Forty buses carrying 41- 49 passengers each were observed. Five (12.5%) buses out of 40 had at least one passenger using a seat belt. Females (54%) had higher seat belt use than males (47.9%). All 40 (100%) bus drivers were observed to wear seat belts. No driver or police were observed to encourage passengers to use seat belts. There was no difference in seat belt use between Saudi national passengers of different socioeconomic status: none wore seat belts. Seat belt use among developed countries (51.1%) was higher than underdeveloped countries (0%) and still developing countries (0%).

Figure 2 shows the breakdown of the two groups in the observational study. Group 1 is the Saudi national pilgrims differentiated by socioeconomic status, and group 2 is the non- Saudi pilgrims by their country's developmental status.

Group 1 contained local Saudi national pilgrims who were traveling from the Eastern Province to Makkah. Ten buses carrying a total of 469 passengers were selected. These passengers were observed based on their socioeconomic class. In all classes the percentage of seat belt use was 0%. This data is shown in Table 1. Group 2 was 15 randomized buses of 675 international pilgrims who completed Hajj and were visiting the second holy city, Madinah. The observed seat belt rate for this group was 0 %. This data is

shown in Table 3. Group 3 was made up of international pilgrims who completed Hajj and were traveling to the Jeddah Airport; 15 buses with a total of 752 pilgrims were observed. The total seat belt use on these buses was 12% as is shown in Table 3. This group was broken down by the developmental status of their countries of origin. Figure 4 illustrates the findings that only the pilgrims from developed countries utilized the seat belts at the rate of 51.1% as seen in Figure 3. Females (54.1%) from developed countries were slightly more likely to wear seat belts than their male (49.6%) counterparts as shown in Figure 4. In Table 2 there is highly significance relation between social level and sex in using seat belt among pilgrims

Table 4 shows the results for all the passengers in the study (1896). The percentage of seat belt use for the total passengers was 4.8%. When grouping all passengers together, males (5.1%) have a slightly higher percentage of seatbelt use than females (4.4%) it is worth note to observe the number of males observed was much higher than the number of females observed.

The results for the drivers of the buses seat belt use was 100%. Every driver was using a seatbelt, and at the checkpoints the traffic police were enforcing this law, but there was no enforcement of seatbelts use to passengers. The conductor of the study also observed the bus driver or group leader gave no encouragement to passengers to wear seatbelts.

**Discussion:** Although there was no variation among Saudi national social classes regarding safety belt use on the transportation buses for Hajj, some variation did occur with regards to the safety belt use amongst non-Saudi national. The overall associated seat belt use with regards to Saudi pilgrims and pilgrims from underdeveloped and still developing nations was at 0%. While in developed countries, countries there is more public awareness, and laws enforcement around seatbelt use, there was 51.1% usage. The numbers in this study are consistent with the WHO Global Status Report on Road Safety in 2015, which states that underdeveloped and still developing countries have the highest risk of dying on a road traffic crash [9].

There is also a direct link between the enforcement of seatbelt laws and seatbelt usage. Every driver in this study was wearing his seat belt, and at every checkpoint it was checked by the traffic officers. However, the passenger seat belt use was neither checked nor enforced by the same traffic officers. In addition there was no encouragement or safety awareness that was given to passenger to ensure seatbelt usage.

There were some limitations to this study. The observer was not allowed on all buses he selected to observe, but was able to complete the needed sample size. Another limitation was that the observer was male, and it was sometimes difficult to judge by observation if the female passengers were utilizing their seat belts. Since this study was limited to four buses, more information might be shown if all types of passenger vehicles were observed.

## **5. Conclusion:**

What accounts for the lack of seat belt use by passengers? This study shows clearly that although seat belts are proven to decrease serious injury and fatalities in road vehicle crashes [5], only 4.8% of passengers used them. The 4.8% of passengers who utilized seat belts were from developed countries. The lack of seat belt use among passengers is endemic to passengers for all economic backgrounds. There is serious work that needs to be done to help prevent injury and death by increasing passenger seat belt use.

According to this study, passenger seat belt laws, although in effect are not properly enforced. Enforcement has been shown to have positive effect on seat belt use in developed countries around the world [10].

## **6. Recommendations:**

1. Make an awareness campaign during Hajj that requires all bus drivers to encourage seat belt use among their passengers.
2. Traffic police enforce seat belt laws for passengers making the bus companies responsible for citations.
3. Increase more of the surveillance system known as (SAHER), to enforce speed and seat belt use.

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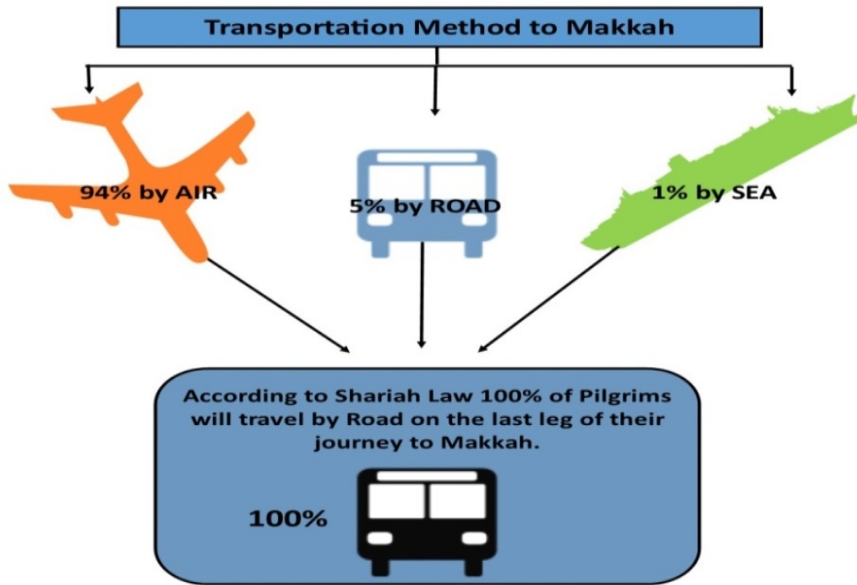


Figure 1: Transportation Methods to

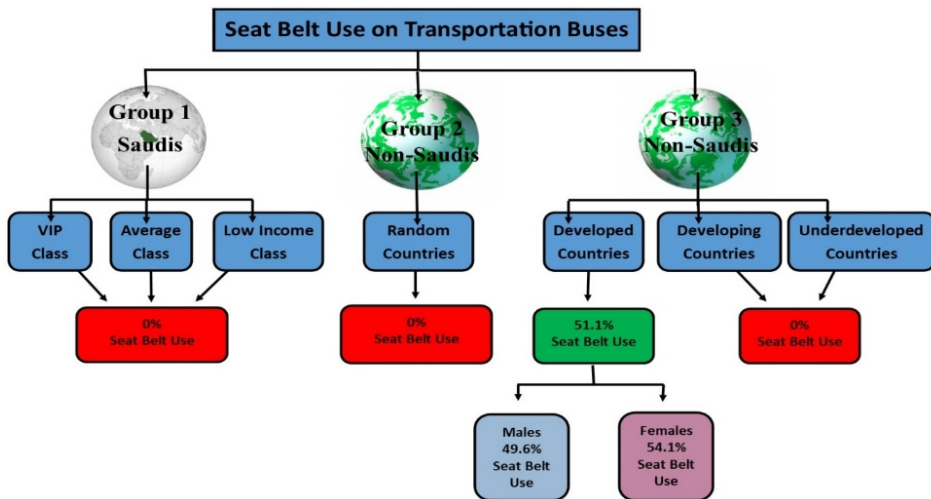


Figure 2: Seat Belt Use on Transportation Buses

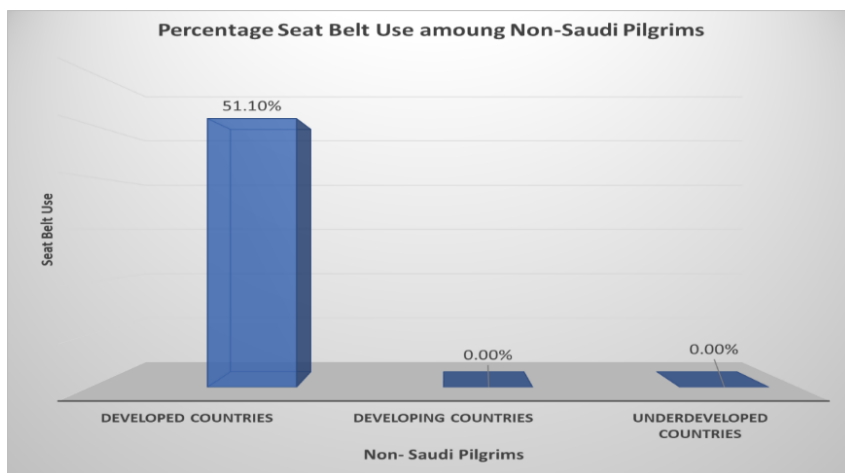


Figure 3: Percentage Seat Belt Use among Non-Saudi Pilgrims

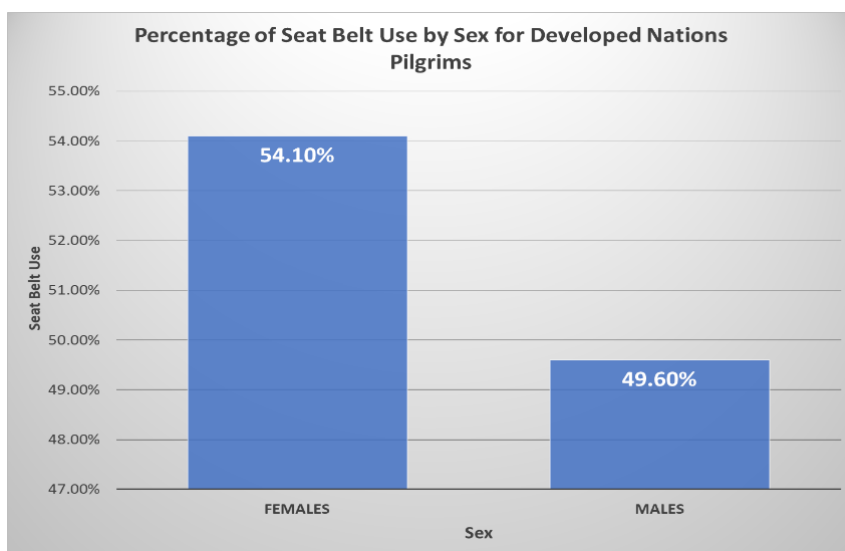


Figure 4: Percentage of Seat Belts Use by Sex for Developed Nations Pilgrims

Table 1: Saudi national pilgrims by socioeconomic status

Type of Agency	Total Passengers	Total Male	Total Female	Male Wearing Seat Belt	Female Wearing Seat Belt
Average Class	192	147	45	1	0
Low Income Class	180	90	90	0	0
VIP Class	97	56	41	0	0
Total	469	293	176	1	0



Table 2: Chi Square test in relation between social level and sex in using seat belt

	Chi Square	Difference	Probability
Female	40	12	0.0001
Male	40.5714	12	0.0001

Table 3: Results for Non-Saudi nationals by country development

Passenger Grouping	Female Passengers			Male Passengers			Total Passengers		
	Total Passengers	With Seat Belts	% Using Seat Belts	Total Passengers	With Seat Belts	% Using Seat Belts	Total Passengers	With Seat Belts	% Using Seat Belts
Developed	61	33	54.1%	115	57	49.6%	176	90	51.1%
Developing	136	0	0%	248	0	0%	384	0	0%
Under-developed	76	0	0%	375	0	0%	675	0	0%
Total	273	33	12.1%	479	57	11.9%	752	90	12.0%

Table 4: Results by group

Passenger Grouping	Female Passengers			Male Passengers			Total Passengers		
	Total Passengers	With Seat Belts	% Using Seat Belts	Total Passengers	With Seat Belts	% Using Seat Belts	Total Passengers	With Seat Belts	% Using Seat Belts
Group 1: Saudi socioeconomic	176	0	0%	293	1	0.3%	469	1	0.2%
Group 2: Non-Saudi Randomized	300	0	0%	375	0	0%	675	0	0%
Group 3: Non-Saudi by country development	273	33	12.1%	479	57	11.9%	752	90	12%
Total	749	33	4.4%	1147	58	5.1%	1896	91	4.8%