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RESEARCH ARTICLE

Evaluating Seat Belt Use in Lebanon (1997-2017)

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Abstract:

Introduction:

The use of seat belts has made a significant contribution to the reduction of road traffic casualties, and the risk inherent with not wearing seat belts in all seats of a vehicle is now well-known worldwide. The use of seat belts has a major role in reducing fatal and nonfatal injuries in all types of motor-vehicles crashes.

Aim:

The aim of this study is to understand the reasons behind the variation in seat belt use over the past two decades in Lebanon. It analyzes the situation and suggests recommendations to improve seat belt use in Lebanon.

Design:

Nine observational studies had been conducted in Lebanon during the last two decades between 1997 and 2017, and one qualitative study was performed in 2017.

Results:

The results show a significant variation in the use of the seat belt. When enforcement efforts are in progress, seat belt use increases. While when there are no checkpoints and the enforcement of seat belt use is almost absent, a significant fall was noticed.

Discussion:

The results of this study proved the failure of the Lebanese government in saving hundreds of lives just by a simple measure of enforcing seat belt law. Although experiences from various countries prove that such laws usually have a long-lasting effect on seat belt use, Lebanon failed to pursue the successful implementation of this law due to security and political problems.

Conclusion:

During the past two decades, Lebanon witnessed continuous fluctuations in seat belt use. Outside few short enforcement campaigns, our observations showed lack in seat belt use. Our observations of seat belt use among drivers and front seat passengers showed a significant correlation between seat belt use and the enforcement of seat belt law.

The greatest national benefits from seat belt use are obtained when wearing rates are very high. This can be achieved only through a sustained enforcement campaign alongside other seat belt wearing interventions such as publicity and education.

Keywords: Seat belts, Lebanon, Road Traffic Injuries (RTI), Injury prevention, Law enforcement, Media campaigns.

Article History

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1. INTRODUCTION

Road traffic crashes cause premature death of around 1.2 million worldwide. Around 30-50 million people are also inj-

ured each year [1]. Over 95% of these deaths and injuries occur in the low and middle-income countries of Africa, Asia, Latin America, and the Caribbean and Eastern Europe [2]. Road Traffic Injuries (RTI) consume a considerable part of the resources of most countries. Seat belts were progressively introduced in European vehicles from the late 1950s and were adapted from aircraft seat belts. Various tests were conducted

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using each of the different types of belts, before that the 3-point lap and diagonal seat belt was the best compromise of all options.

Seat belts are secondary safety devices with several objectives:

Preventing ejection from the vehicle due to an accident.

Reducing the risk of contact within the vehicle or reducing the speed of such an impact.

Providing a distributed force to the wearer to give necessary support in a traffic crash and restraining the vehicle occupant before guiding them back into their seat.

The first recorded traffic victim was Mary Ward, an artist-biologist. She died after a crash of a steam vehicle that jumped into a turn and projected the occupant out of seat [3]. Her death in 1869 would not have occurred if she would have been restrained with a safety belt.

Safety belts were first introduced in automobiles in the 1950s, based on the biomechanical understanding that they would reduce the impact of crash [4]. The first mandatory belt wearing law in a jurisdiction with a substantial driver population came into effect on 22 December 1970 in Victoria, Australia [5]. In 1971, belt use increased in Victoria from about 15% to about 50%, and a reduction of about 12% in deaths of affected occupants (drivers and passengers in front seats) was reported [6]. Influenced by reports of casualty reduction in Victoria, many jurisdictions eventually passed belt wearing laws.

The most frequent and most serious injuries occurring in frontal impact to occupants unrestrained by seat belts are to the head, followed by the chest and abdomen [7]. Among other injuries, those to the leg and neck occur most frequently [8].

1.1. Importance and Effectiveness of Seat Belt Use

Wearing a seat belt reduces the risk of a fatality among front seat passengers by 40-50% [9, 10]. The use of seat belts is the single most effective means of reducing fatal and nonfatal injuries in motor-vehicle crashes. In all types of crashes, manual lap-shoulder belts are approximately 45% effective in reducing fatalities in passenger cars and 60% effective in light trucks [11].

Failure to use a seat belt is a major risk factor to road traffic injuries and fatalities among vehicle occupants [12]. When a motor vehicle crash occurs, a car occupant without a seat belt will continue to move forward at the same speed at which the vehicle was travelling before the collision and will be catapulted forward [13] most likely into the steering wheel column if driving, the dashboard if a front seat passenger, or the back of the front seats if a rear seat passenger [14].

Many people are alive today only because they were protected by their seat belts during a crash. As for WHO's estimations, millions of deaths have been prevented by seat belts over the past five decades. Yet, seat belt compliance is worryingly low in Lebanon as in many other low and middle income countries. Hundreds of preventable road traffic tragedies are still occurring every day because seat belt of the

lack of seat belt compliance. More needs to be done to convince political leaders, police authorities, drivers and passengers that seat belts are essential for safe driving.

The American College of Emergency Physicians (ACEP) suggests that seat belts are the most effective means of reducing deaths and serious road traffic injuries. They also calculate that 75% of all vehicle occupants ejected from a vehicle in a traffic crash die. Therefore, seat belts provide the greatest protection against ejection in a traffic crash [15].

Seat belts are approximately 50% effective in preventing fatalities in crashes in which drivers or passengers would otherwise die. It is estimated that seat belt use prevented about 15200 deaths in the United States of America in 2004. If all vehicle occupants over 4 years of age in the United States of America had used seat-belts in 2004, nearly 21000 lives could have been saved [16].

Analysis by the European Transport Safety Council estimates that within the European Union countries, seat belts currently reduce driver fatality by 40%. Wearing rates in the European Union vary widely from around 70-95%. If all European Union countries were to achieve a 99% wearing rates for drivers, 2400 lives would be saved [17].

1.2. The Need to Enforce Seat Belt Use

Globally, progress has been made to protect rear-seat car occupants through the implementation of comprehensive seat-belt laws. In 2004, 111 countries (69% of the world's population) have comprehensive seat belt laws covering all occupants [18]. Lebanon still needs more efforts to implement the resolution 57. 10 of 2004 of the World Health Assembly WHA, that recommended member states to make mandatory use of seat belts [19].

Globally, hundreds of thousands of drivers and passengers die or are seriously injured every year due to the failure to use seat belts. Those deaths and injuries account for a significant percentage of all traffic fatalities. This could be reduced considerably by more extensive use of seat belts in the front and rear seats. Many of the deaths caused by road crashes could have been avoided by using seat belts. According to a study in 1999 by the National Highway Traffic Safety Administration, the protective effects of seat belt use are well documented in the scientific literature. It is estimated that seat belts reduce the risk of serious injury to the head, chest, and extremities by 50% to 83% [12].

Informative and educational campaigns aiming at promoting the use of seat belts by the front seat occupants were common and had been proven to be efficient not only in most high-income countries but also in many middle and low-income countries, however, the increase in the voluntary use of seat belts is crucial in raising the acceptability of people regarding seat belt use.

2. OBJECTIVE

This study analyzed the use of the seat belt in Lebanon during 20 years *via* both observational and qualitative study. The aim of this paper is to assist all decision-makers in preparing and implementing the needed decisions that can lead

to improving seat belt use, traffic law enforcement and road safety in Lebanon.

Why is there a variation in seat belt use and what are the reasons behind the failure of seat belt law in Lebanon?

3. METHODS

The study consisted mainly of observational studies about seat belt use conducted during the last two decades in Lebanon. We used data from samples to make national estimates, decisions, and generalization about seat belt use in Lebanon. One Qualitative and 9 observational studies were conducted for seat belt use in cars.

It is important to note that until 25 November 2012, the Lebanese traffic law did not state the mandatory use of seat belts in rear seats. Until January 2019, no enforcement campaign has ever been done to enforce the new traffic law regarding the use of seat belts in rear seats. This study has thus disregarded the observation of seat belt use in rear seats.

3.1. A Qualitative Study

The qualitative study in 2017 consisted of semi-structured interviews for 10 persons to identify the reasons behind the lack of the use of seat belt. We found out the following reflections in our short interviews that helped us to describe their behavior.

The answers were classified into two main categories:

3.1.1. Negligence

- **Over Confidence** of the driver, who did not always use seat belt. No need for seat belt.
- **Imitate** their friends do not use seat belt.
- **Limitation of comfort** arguing that the seat belt may restrict movement, and could limit freedom and comfort

3.1.2. Unaware Behavior

- **Perception of risk** the driver does not understand the additional risk that he could face without being restrained.
- **Non conviction** of the importance to use seat belt. Many mentioned that no policeman would fine them. Police have other things to do such as following terrorists and criminals.
- **Ignorance** of the benefits to use seat belt by considering that if a crash occurs, the driver may save his life by going out of the vehicle, while if he puts the seat belt he cannot jump and save his life from fire or drowning. Table 1 resumes the reasons behind not using seat belt.

3.2. The Observational Studies: Population

Each observational study had two main components: seat

belt for the driver and seat belt for the passenger in the front seat. The sample was based on the observation of 8000 vehicles in total: 4000 to check seat belt use of the car drivers and 4000 to check if the passenger in the front seat is using seat belt. The observations were distributed among 10 different points.

The selection process of the observation point was based on the areas where the traffic crashes have more occurrences. In every study, three days were spent to observe seat belt use on each point. In each day the time allocated for observations is around three hours.

Table 1. Reasons behind not using the seat belt.

Negligence	Unaware Behavior
Over Self Confidence	Perception of the risk
Imitating others	Non conviction of the importance of seat belt
Limitation of comfort	Ignorance

3.3. Study Period

The study was repeated many times between 1997 and 2017. The first three studies did not cover Bekaa and South region due to security reasons. The Table below states the dates of the 9 studies.

Table 2. Dates of the 9 studies.

Study	Date of the Study
The first study	September 1997
The second study	August 1999
The third study	June 2001
The fourth study	April 2002
The fifth study	December 2005
The sixth study	September 2009
The seventh study	November 2013
The eighth study	December 2014
The last study	May 2017

3.4. Data Collection

The sample represented approximately the number of inhabitants and circulating vehicles in the five major Lebanese regions known as "Mouhafaza": 1200 vehicles in Mount Lebanon (Around 30%), 1000 vehicles in Metropolitan area of Beirut (25%), 600 vehicles in the North (15%), 600 vehicles in the South (15%) and 600 vehicles in the Bekaa (15%).

In each of the 5 regions, one point for observation was selected in urban area and the other one in rural area. Half of the vehicles were observed on 5 selected observations points that are few kilometers on the highway leading to the major 5 cities (300 vehicles in the city of Zahle for Bekaa, 600 vehicles in the city of Baabda for Mount Lebanon, 300 vehicles in the city of Tripoli in the North, 300 vehicles in the city of Saïda for the South and 500 vehicles in Achrafieh region for Beirut).

The sample size is similar for vehicles which are observed

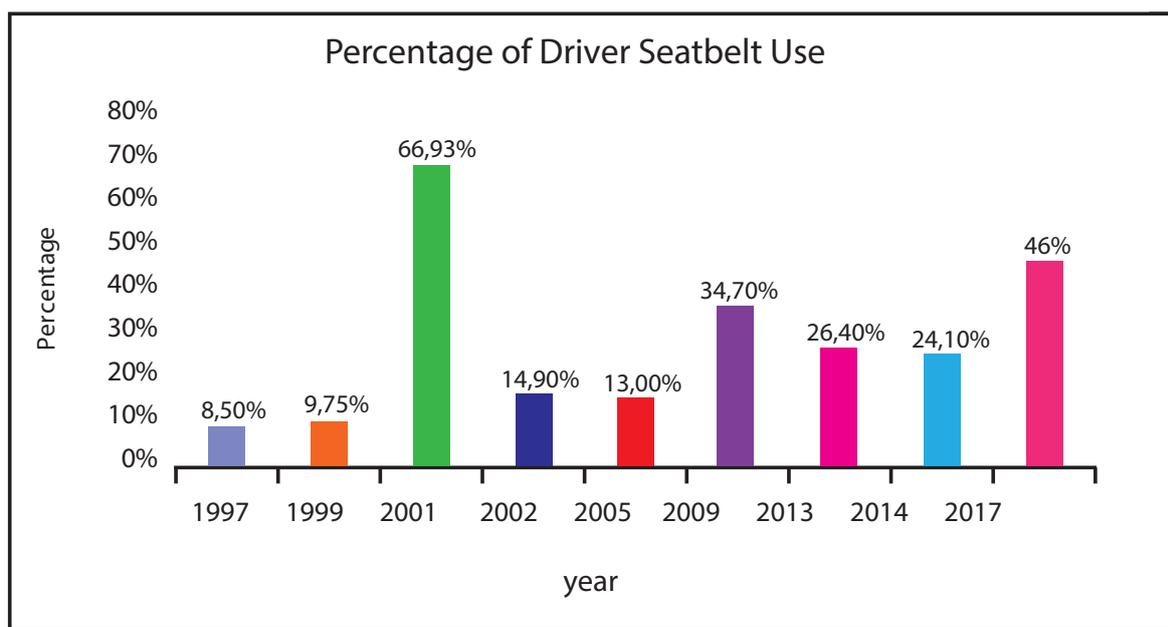


Fig. (1). Results of the observational studies for the driver.

in the other 5 selected observing points which were situated in the rural areas of the 5 Lebanese regions.

Data collection consisted on a table of two columns: YES and NO.

YES indicates the person who uses a seat belt and NO indicates the person who does not.

At the end of the observation, we sum the number of YES and NO and we calculate the percentage of seat belt users and non-users.

During the period 1997- 2017, the percentage of people using seat belts went up and went down many times. In our first three studies, we were not able to cover two districts that are on the Lebanese borders due to security issues (Fig. 1).

The first study that was done in 1997, which showed 8.5% use of seat belts (238 were using seat belts out of the 2800 observed).

The results of the second study in 1999 showed a slight increase in seat belt use. The observations on the same sample in the same regions showed that only 9.57% were using seat belts (268 were using seat belts out of the 2800 observed).

The third study in 2001 showed a huge increase in seat belt use: 66.93% were using seat belts (1874 were using seat belts out of the 2800 observed).

The first time that we started to observe seat belt use in Bekaa and in the South was in the fourth study in 2002. Only 14.9% were using seat belts (596 out 4000 observed).

The fifth study in 2005 showed the decrease in using seat belts to 13%. (520 were using seat belts out of the 4000 observed) while the sixth study in 2009 showed 34.7% increase in the use of seat belts by drivers nationwide (1388 used seat belts from the 4000 observed).

The seventh study in 2013 showed another decrease of

26.4% in the use of seat belt by drivers nationwide (1056 used belt from the 4000 observed).

In the eighth study in 2014, there was a decrease in the percentage of drivers using seat belts in Lebanon to 24.1% in 2014. (964 were using seat belts out of the 4000 observed).

The last study in 2017 showed an increase of 46% in the percentage of drivers using seat belts in 2017

During the period 1997-2017, the use of seat belts for passengers in front seat has increased and decreased many times over the past two decades but is still relatively low. The use of seat belts for the front seat passenger was always little less than that for the drivers (Fig. 2).

In the first three studies of 1997, 1999 and 2001, we were not able to cover two districts that are on the Lebanese borders due to military operations in those two regions.

The first study in 1997 showed 6.83% use of seat belts (191 were using seat belts out of the 2800 observed).

In the second study, the observations on the same sample in same regions showed that 7.43% were using seat belts (208 were using seat belts out of the 2800 observed).

The observations of the third study in 2001 showed a huge increase in seat belt use for the front seat passenger: 65.43% were using seat belts (1832 were using seat belts out of the 2800 observed).

In the fourth study in 2002, we started to observe seat belt use in Bekaa and in the South for the first time. Only 14.15% were using seat belts (566 out 4000 observed).

The fifth study in 2005 showed another time the fall of the percentage of people using seat belts in Lebanon to 12.37% in 2005. (495 were using seat belts out of the 4000 observed) while the sixth study in 2009 showed the increase to 26.65% in the seat belts use nationwide in the front seat passenger

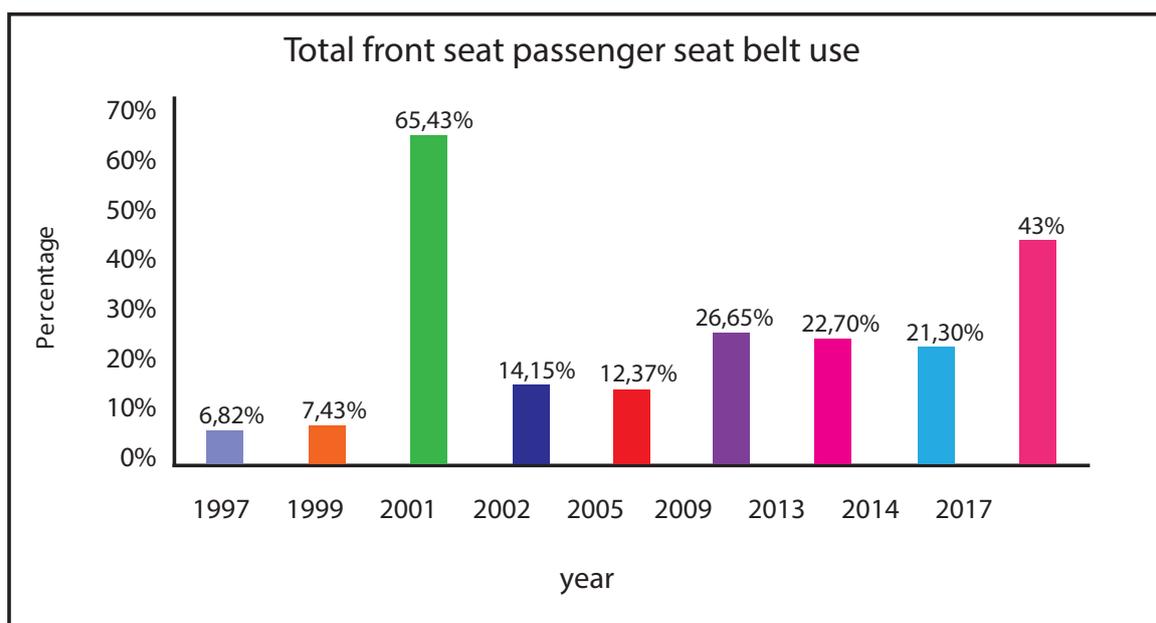


Fig. (2). Results of the observational studies for the front seat passengers.

(1066 used seat belts from the 4000 observed).

Also, the seventh study in 2013 showed another decrease of 22.7% in the use of seat belt by the front seat passenger nationwide (908 used the seat belts from the 4000 observed).

The eighth study in 2014 again showed a fall of 21.3% in the people using seat belts in the front seat passenger in Lebanon. (852 were using seat belts out of the 4000 observed).

The last study in 2017 showed an increase of 43% in the use of seat belt in the front seat passenger .

3.5. Ethical Consideration

In the qualitative study, the observed people were not identified by nationality, gender or race. So, the results are not related to any individual in specific. All information will continue to be anonymous, and all collected data will be used for this study only.

Before taking their speech, participants were asked whether they will accept or not to be interviewed and we assured that the name or any identification of the participants will not be disclosed. In each interview, the targets of the study were described to the expected participants and the informed verbal consent was received. They were given freedom to be interviewed or not and if they accepted they were free to stop the meeting at any point without any insistence. These interviews were audio-recorded after receiving the approval of the participant. All information will continue to be anonymous, and all collected data will be used for this study only. We informed the respondents about the study objective and the respondents' rights of withdrawal prior to interviews or even during the interviews.

4. RESULTS AND DISCUSSION

The first study showed a very low use of the seat belt by the driver (8.5%) and passenger (6.83%).

After three years, the results of the second study showed a significant increase in the seat belt use. The observations showed that 9.57% of drivers were using seat belts and 7.43% of passengers in front seats were also using seat belts. YASA continued its efforts and put more pressure on the government to enforce traffic rules and regulations.

4.1. First Enforcement Campaign of Seat Belt by the Lebanese Government

As per international experience, a high rate of usage has been achieved only by enacting and implementing seat belt laws. Experiences from many high-income countries such as Canada, Sweden and the United Kingdom convinced the organizers to lobby and organize many activities during the following months to convince the Minister of Interior to enact a decree needed to activate the seat belt law, which dated back to 1967. During that time, what also helped was the existence of a political discussion in Lebanon towards the need and benefits of this law. Many political figures stated that the enactment of a seat belt law is required only after reaching a relatively high usage rate. The Minister of Interior Affairs stated that the decision to apply the legislation enacted in 1967 should be made urgently.

On May 3, 2001, the Ministry of Interior declared that the national seat belt law is enacted and will be enforced in the beginning of June 2001. It is, however, not an official law in a legal sense, because the Minister enacted a decision to apply the article related to the mandatory seat belt use to front seat passengers that was introduced as a law in June 1967, without being implemented for around 34 years. On the other hand, public awareness campaigns were jointly performed by the ministry and YASA that made many road users aware about the importance of seat belt use.

As in most countries, the onset of belt enforcement appears to be the critical factor and the announcement of impending

enforcement was not enough. The decision made almost no change during the 27 days from the third of May till the first of June. The application of this law produced a substantial increase in the use of seat belts. The effect on the behavior was immediate and astonishing. The results of the observations were surprising.

Around 40% increase in the use of seat belts was observed than a week earlier. This effect is almost similar to that of other countries. The fact that the increase in seat belt use was immediate and simultaneous with the enforcement effort is compelling evidence. For example, on the day British Columbia introduced its seat belt law, a rise of 30% was recorded in 24 hours (20).

In 2001, the mass media focused more attention on the seat belt law, especially during the first month after its introduction. For the first time after the Lebanese civil war (1975-1990), the name seat belt was highly used by citizens, foreigners and by community leaders everywhere in Lebanon. It is essential that many target groups such as taxi drivers provided the necessary support and willingness to apply this law.

Not only the individuals but also the Lebanese community at large was committed in accepting this law and considering the decision made by the minister as a needed one to decrease the burden of road traffic injuries in Lebanon.

This was clearly reflected in the results of the observation. In June 2001, our study showed a high increase in seat belt use: 66.93% of drivers were using seat belts (1874 were using seat belts out of the 2800 observed) and 65.43% of passengers in the front seats were using seat belts (1832 were using seat belts out of the 2800 observed).

The problem appeared approximately after few months when a political problem occurred in the first week of August in Lebanon, and interrupted the continuous engagement of the ministry and its various agencies in implementing this law.

4.2. Failure to Continue Law Enforcement

In the fourth study, we started to observe seat belt use in Bekaa and in the South for the first time. These two regions somehow negatively affected the results because these regions were in difficult security situation for decades and there was almost no enforcement of traffic rules and regulations. Only 14.9% of drivers were using seat belts (596 out of the 4000 observed) and only 14.15% of front seat passengers were using seat belts (566 out of the 4000 observed). This huge decrease was also due mainly to the weak law enforcement.

Between 2004 and September 2006, Lebanon observed a very tough period due to the assassination of Prime Minister Hariri, demonstrations, Syrian leaving the country. Public officials were not concerned at all with the traffic law. Results were also very low compared to 2001.

The fifth study showed the fall of the percentage of drivers using seat belts in Lebanon to 13% in 2005. This study showed the fall of 12.37% in passengers using seat belts in the front seat in Lebanon.

4.3. Another Increase Due to Law Enforcement

The new minister of interior gave priority to the enfor-

cement of the traffic law, and seat belt use was well enforced. Meanwhile, many public awareness campaigns were undertaken. Results showed a significant increase in seat belt use. In 2009, 34.7% of drivers and 26.65% of passengers in the front were using seat belts. This provided evidence that enforcement has a major role in assuring the increase in seat belt use.

The seventh study showed a 26.4% decrease in the percentage of seat belt use by drivers, and 22.7% in the use of seat belt by the front seat passenger nationwide. This huge decrease was also due mainly to the weak law enforcement.

The eighth study showed a fall of 24.1% in the use of seat belts by the drivers in 2014 and another decrease of 22.7% for seat belt use in the passenger seats nationwide. This reflects the lack of enforcement of traffic law. This was mainly due to the security and political problems in Lebanon.

The last study showed a considerable increase of 46% and 43% in using seat belt by drivers and front seat passengers respectively. This increase is due to the application of the Lebanese traffic law that was passed in 2012 and applied effectively from April 2015.

This study proves again that when law is applied, the use of seat belts among the drivers and front seat users increases.

In brief, the results of these observational studies prove the wide fluctuation in seat belt use. When enforcement campaigns are well executed, the percentage of use of seat belt increases, while when these campaigns stop, the percentage of seat belt use decreases.

Based on these studies, we can consider that there is a major problem in the confidence of road users in the sustainability of traffic law enforcement in Lebanon.

4.4. Seat Belt in Rear Seats is Not Enforced Yet

The installation and use of seat belts in the rear seats is important not only for those occupying the rear seats but also for the persons in the front seats since the dynamic force of a person in the rear seat thrown forward is considerable and may break the front seat. It should consequently be compulsory to have seat belts installed and used in the rear seats in heavier vehicles.

After huge joint efforts by the parliamentary committee of transport and public works, YASA and many Lebanese experts in traffic safety, a new Lebanese legislation #243 was passed on 25 November 2012. This new traffic law made it compulsory to have seat belts installed in all seats, even in old cars, and made it also compulsory to use seat belts in all seats. From April 2015, the traffic police made some efforts to enforce traffic law, but unfortunately the enforcement of seat belt use in front seats was not a priority. Until January 2019, this new law regarding seat belt use in the back seats was never implemented. Therefore, it is highly recommended to organize more public awareness campaign and to start enforcement of seat belt use in rear seats.

4.5. Merits and Demerits of the Method

These observations were important for all who are interested in promoting road safety. Based on the answers of

interviewees in the qualitative study, the people concerned by road safety can assist in the design and the implementation of future public awareness campaigns about seat belt use.

The major problem was that this study did not take into consideration the age of drivers (many are under age) and most of drivers have no formal driver's license.

In South Lebanon and in the Bekaa regions, we did not observe rural areas where the use of seat belt is most probably lower. This was due to sensitive security conditions. In fact, the observers were not able to perform their tasks in these regions.

4.6. Comparison with Other Countries

Experiences from many countries have proven that successful programs to raise seat belts use had been based on both a leadership role of the police in enforcement and on maximization of the publicity campaigns. A controlled intersection study, which is part of the U.S. National Occupant Protection Use Survey (NOPUS), has shown that safety belt use has increased for both sexes, for nearly all age groups, and for all races for which data are available.

In Canada, the rates of use were typically around 50% sometime after laws were passed in the mid-1970s, but have increased in response to various measures to around 90% [21]. Switzerland provides a particularly interesting case, because the law that became applicable in January 1976 was repealed by voter petition in July 1977 that became effective again after October 1977 [22]. The following changes in fatalities were recorded:

- After the first law passed, fatalities decreased.
- After law was repealed, fatalities increased.
- After the law reinstated, fatalities decreased.

Argentina faced almost the same situation as Lebanon. In 1992, the seat belt law was introduced in Buenos Aires. This law raised the wearing rate from 6% to 32% but due to the lack of enforcement, rates subsequently declined in 1995 to 13%. In 2004, new traffic law raised again the wearing rate to 22% but the best increase in the wearing rate occurred after law enforcement in February 2005. It is estimated that 1000 lives could be saved yearly if the wearing rate is maintained [23].

5. RECOMMENDATIONS

Although road safety had received some attention in the past decade in Lebanon, the government, the municipalities and all road users must adopt more sustainable efforts to comply with the United Nations General Assembly Resolution A 60/5 (2005) "invites member states to implement the recommendations of the world report on road traffic injury prevention including those related to the five main risk factors, namely the non-use of helmets, drinking and driving, the non-use of safety belts and child restraints, inappropriate and excessive speed, as well as the lack of appropriate infrastructure" [24].

Based on the variations in seat belt use in the observational studies, it is highly recommended to increase seat belt use and to reduce the burden of Road Traffic Injuries RTI on the Lebanese society by enforcing seat belt law nationwide and in all regions. The qualitative study helped to understand the real

factors that prohibited the driver and the passengers from using seat belt. In addition to enforcement, public awareness interventions are also needed to encourage drivers and all passengers to fasten their seat belts.

Countries with the best seat belt compliance records have achieved their position by strong enforcement of seat belt law, backed up by sustainable public awareness interventions. This combination of enforcement and public awareness raising is essential for increasing and maintaining seat belt compliance.

In the United States of America, many interventions were implemented to increase seat belt use during the last four decades. Attempts to encourage individuals using seat belts through awareness campaigns, publicity or persuasion have had little success [25]. As in most countries, the results of these public awareness campaigns for voluntarily use of seat belts were deceiving.

Therefore, based on the information gathered from many programs in different countries, law enforcement and awareness campaigns are associated with clear reductions in the severity of RTI [26, 27] if they are both implemented simultaneously [28].

Seat belts can also reduce fatalities among rear-seat car occupants by 25-75% [29]. Therefore, it is highly recommended to observe seat belt use in rear seats in future observational studies in Lebanon in order to orient future interventions.

6. ENFORCEMENT

Based on the information obtained from programs that collected follow-up data, safety belts use rates declined in the months after enhanced enforcement programs ended [30].

Enforcement authorities may find difficulties in some circumstances to enforce seat belt wearing legislation (in case where drivers appear to be complying or if the vehicles windows are tinted). To overcome such situations, it is recommended that stationary vehicle checks are conducted at appropriate and convenient sites.

To avoid confusing messages being delivered to the public, it is vital that enforcement officers and public officials to set a good example to other road users by wearing seat belts throughout every journey.

Enhanced and sustainable enforcement of safety belts law should involve the increasing number of traffic police on patrol, increasing citations for safety belts violations during regular patrols, use of mobile safety belts checkpoints, or a combination of these efforts. Although long-term effects remain open to question, there is evidence that repeated implementation of enhanced enforcement campaigns results in cumulatively higher levels of seat belt use [31].

6.1. Maximizing Publicity

Using publicity in isolation is unlikely to be effective. Publicity campaigns in the UK between 1970 and 1982 were the main cause for the rise of 40% in the rate of using seat belts, which is considered a significant increase compared to the pre-publicity rates. But the introduction of seat belt legislation (in 1983) combined with the enforcement of the law

by the police and supporting publicity and education campaigns raised the compliance rate to around 90%.

Canadian provincial officials launched highly publicized enforcement campaigns in the early 1980s that resulted in substantially increased belt use [32]. Therefore, all enforcement should be accompanied by a wide publicity campaign to strengthen the impact and ensure wider acceptability.

6.2. Reaching Those with High-Risk of Accident

In Lebanon, as in many other countries, there is a major challenge to convince people who are at a high risk of being involved in traffic crash. There is a belief among most people that they are skilled, above-average drivers and can avoid a crash [33]. In case of joint enforcement campaigns and intensified publicity, it is expected that many will change the risk perception and will be convinced about the crucial role of using seat belts for saving lives.

7. LESSONS FROM SEAT BELT ENFORCEMENT IN THE UNITED STATES OF AMERICA

Since 1984, the United States has a variety of state laws governing and enforcing the use of seat belts in different kinds of vehicles. Seat belt laws are determined by each state [34].

In 2016, 34 states have primarily enforced seat belt laws, which means a police officer can stop and cite drivers if they have no other traffic violation except failure to wear a seat belt. For example, compliance rates in the two states with primary law enforcement such as California and Georgia are more than 97%. 15 other states such as Massachusetts and South Dakota (74.1% and 73.6% seat belt use, respectively), have secondary enforcement laws, which means that drivers can only be fined for a failure to use seat belt if they have also violated another law such as passing a red traffic light. New Hampshire is a unique state that does not have seat belt laws for adults and has the lowest compliance rate of 69.5% in the whole United States [35].

In brief, drivers and other passengers in the U.S. states with primary enforcement laws are more likely to wear seat belts than in states with secondary enforcement laws [36], and have by far less fatality rates [37]. Therefore, we have a strong evidence that support our analysis that more strict enforcement has a direct correlation with increasing seat belt use [38] and hence dropping fatality rates.

CONCLUSION

Lack of safety belt use is a major contributing factor for injury [39, 40]. Research proved that using seat belts when driving vehicles significantly reduces traffic injuries and fatalities [41 - 43]. Publicity, education and incentive campaigns have all been proven to increase seat belt wearing rates to a certain level. However, the most effective tool for increasing seat belt compliance is sustainable enforcement. Public awareness campaigns that have been simultaneously supported by enforcement have achieved the most significant increases in wearing rates. Social media can be a major platform for raising awareness and lobbying to increase seat belt use.

Unfortunately, enforcement efforts in Lebanon did not

continue for long periods. After the failure of pursuing enforcement, the percentage use of seat belt use witnessed drastic drops which were also reflected on the national deaths and disabilities resulting from crashes. From 2001, till now, enforcement agencies applied seat belt laws many times in short campaigns (mainly in 2004, 2009 and 2017) that failed to be sustainable. During the short periods of seat belt law enforcement, the observations showed a significant increase in the seat belt use (reaching around 70% in June 2001, 35% in 2009 and 46% in 2017). Outside these short periods of relatively strict seat belt law enforcement, the percentage of seat belt use was deceiving. This also proves that people are not convinced of the importance of the seat belt on saving their lives and reducing injuries in case of a crash.

This study provided further evidence that safety belt use is directly correlated with the enforcement and the issuance of fines. The experience of Lebanon from 2001, 2009 and 2017 proved that the increase of seat belt use was directly correlated with the fear factor of mobile check points by law enforcement agencies more than all public awareness that were implemented many times in Lebanon.

In many counties, the enforcement of mandatory seat-belts laws and the appropriate public awareness campaigns had been effective in increasing rates of seat belt wearing if they were both implemented in the same time.

AUTHORS' CONTRIBUTIONS

ZA & KD planned the study. ZA & MA conducted data collection. All authors contributed in writing the final manuscript.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

No animals/humans were used for studies that are the basis of this research.

CONSENT FOR PUBLICATION

Informed consent was obtained prior to data collection.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest, financial or otherwise.

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