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Alcohol consumption as an incremental factor in health care costs for traffic accident victims: Evidence in a medium sized Colombian city

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ABSTRACT

Objectives: Identify the possibility that alcohol consumption represents an incremental factor in healthcare costs of patients involved in traffic accidents.
Methods: Data of people admitted into three major health institutions from an intermediate city in Colombia was collected. Socio-demographic characteristics, health care costs and alcohol consumption levels by breath alcohol concentration (BrAC) methodology were identified. Generalized linear models were applied to investigate whether alcohol consumption acts as an incremental factor for healthcare costs.
Results: The average cost of healthcare was 878 USD. In general, there are differences between health care costs for patients with positive blood alcohol level compared with those who had negative levels. Univariate analysis shows that the average cost of care can be 2.26 times higher (95% CI: 1.20–4.23), and after controlling for patient characteristics, alcohol consumption represents an incremental factor of almost 1.66 times (95% CI: 1.05–2.62).
Conclusions: Alcohol is identified as a possible factor associated with the increased use of direct health care resources. The estimates show the need to implement and enhance prevention programs against alcohol consumption among citizens, in order to mitigate the impact that traffic accidents have on their health status. The law enforcement to help reduce driving under the influence of alcoholic beverages could help to diminish the economic and social impacts of this problem.

1. Introduction

Traffic accidents represent a major public health issue around the world. It is the leading cause of death among young people between 15 and 29 years old, and the 8th leading cause of mortality worldwide. Traffic accidents cause 1.24 million deaths annually around the world, and around 20–50 million injured people [1]. The estimation of years of life lost and injury repercussions are a relevant subject. Therefore, studies that estimate the economic burden that healthcare represents are considered fundamental for public policies. Several studies have already analyzed the direct costs associated with healthcare due to traffic accidents and take into account those factors that make up the largest portions of these costs [2–5]. The consumption of alcohol and psychoactive substances, and the lack of use of protective elements such as helmets and seat belts represent an increasing risk in the severity of the injuries, hospitalization periods and healthcare costs [5–7].

Alcohol consumption is known to be one of the leading causes for severe and deadly injuries [8,9]. Gómez et al. [10] explain how drivers who have a blood alcohol concentration (BAC) between 0.5 g/L and 0.7 g/L, are 4–10 times more likely to be involved in a fatal traffic accident than those who do not have alcohol in their blood. Additionally, drivers with BAC in between 0.2 g/L and 0.4 g/L are 2–5 times more likely to die in a traffic accident. It was estimated that 45,500 people were injured from traffic accidents in Colombia during 2012; this is equivalent to a rate of 84.17 injured per 100,000 people. Colombia experienced in 2013 the highest mortality rate of the past 10 years associated to traffic accidents. The rate was estimated to be 13.21 deaths per 100,000 people. 2.3%

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of the deaths and 3.7% of the injuries were related to victims with positive alcohol concentration in their blood [11].

Costs for healthcare in Colombia have been previously estimated in Bocarejo et al. [12]. Likewise, studies have been conducted to evaluate the difference in average costs of healthcare taking into account the consumption of alcohol in Bogotá DC.[1] Despite this, there are no similar studies for medium sized Colombian cities.

Therefore, the objective of this study is to analyze the main characteristics of traffic accident victims in the city of Sincelejo (Colombia). Costs are also analyzed taking into account social and demographic information. Alcohol consumption is described and evaluated as a variable that increases healthcare costs.

2. Methodology

A prospective observational study was done in the city of Sincelejo, Colombia. Participants were traffic accident victims that arrived to the emergency sections of three different hospitals. Data collection was done between the 9th and 23rd of December 2013. The ethics committee of each hospital signed an approval for the study to be conducted. The data included every patient over 18 years, who signed a consent form.

Data was collected by previously trained nurse auxiliaries, who were present 24 h a day and were organized in different shifts. Patients willing to participate answered a survey, where social and demographic information was included. Injury descriptions were also required in the survey. The concentration of alcohol in blood was determined indirectly by the breath alcohol concentration (BrAC) test; this test was performed by the auxiliaries and is usually done in emergency sections worldwide [13]. The instrument used was the Alco Sensor FTS of Intoximeters Inc. It is estimated that this instrument has a sensitivity of 85.9% and specificity of 85.8% [14]. This test was not conducted on patients who arrived 6 h after the accident, or those who refused even though they had previously signed the consent form.

Access to billing information was authorized by those patients involved in the study. The hospitals provided bill information for cost analysis. A follow up was done for every patient until their recovery process at the hospital was completed; once the patient was discharged no more billing information was acquired. This was done to guarantee that all the procedure costs performed at the hospital were taken into account.

A descriptive analysis of the data was done with frequency charts for categorical variables such as gender, occupation, age group, affected body parts, and severity of injures. These were calculated with the maximum abbreviated injury scale (MAIS). Alcohol level results were divided into three groups: positive, negative, and not conducted. Any alcohol concentration level detected was considered positive because the maximum level allowed by Colombian law is 0.2 g/L, which is considered a zero tolerance level. For continuous variables such as costs and days in which medical attention was given, measures of central tendency were calculated such as the mean and median along with their respective measures of dispersion. Specific total costs per patient were used as outcome variables; these costs included direct medical expenses.

To assess potential factors associated to increasing health costs and specially to evaluate the possibility of alcohol consumption as a significant factor, the application of the ordinary least squares (OLS) model was considered. The use of this model is appropriate when the assumptions of homoscedasticity and no autocorrelation of residuals are fulfilled. Breusch–Pagan and White [15,16] tests were conducted to evaluate these assumptions. The distribution function of the data was asymmetric with positive bias. The tests showed that residuals were heteroscedastic, which can cause biased and inefficient estimations [5,17]. Therefore, a generalized linear model (GLM) with a logarithmic link function was used. The modified Park test [17,18] evaluated the distribution function associated with the data, having the gamma distribution (Υ) as the best result. It was estimated through the maximum likelihood (ML) method.

The ratio between the average cost and the BrAC test results, social demographic characteristics and severity index (MAIS), was calculated with its respective confidence interval of 95%, obtained by a univariate GLM. Finally, this ratio was adjusted with a multivariate GLM controlling for age, gender, education, occupation, road user group, and severity of the injury. The information collected was entered into a database designed in Microsoft Access® 2007 and statistical analysis was performed using STATA® 13.

3. Results

3.1. Participants

During the study period a total of 343 road accident victims arrived to the emergency sections. 68 (19.8%) were excluded from the study, as they were underage (18 years or younger). 7 patients (2.6%) refused to take part of the study. Therefore, it was conducted with 268 patients. BrAC test was applied to 216 patients; the remaining 52 did not test either because the interview was conducted 6 hours after the event or only accepted providing sociodemographic information.

3.2. Social and demographic characteristics

Table 1 shows some of the socio-demographic characteristics of patients. It also contains a description of injuries, affected parts of the body, and hospitalization periods. 75.7% of the patients were men. Approximately 50% of total patients were between 18 and 30 years old. The average age was 34.9 ± 14.3 years, with a minimum of 18 and maximum of 90 years. 56.0% of the patients said to be self-employed and 22.0% were employed by other means. Regarding education levels, 44.0% stated to have secondary education, 27.6% primary, and 20.1% college degree. 11.9% of road accident victims were pedestrians, 54.3% were drivers and 34.7% were passengers.

By applying the maximum abbreviated injury scale (MAIS) the following results were found: 38.8% of injured patients had moderate injuries (MAIS = 2), 29.9% had more serious injuries (MAIS = 3), 12.3% were registered with severe trauma, and 5.6% with critical trauma. The most frequent affected body parts were the limbs, including hip injuries. External injuries like burns due to friction (18.7%) and traumas to the head and neck (17.5%) were significant.

Distribution according to road user group was the following: 51.2% were drivers, 36.6% passengers, and 12.2% pedestrians. Taking into account only the 216 results from patients who performed the BrAC test, the prevalence of driving under the influence of alcohol of 19.0% (CI 95%: 14.0% to 24.2%). Specifically, prevalence for drivers was 18.4% (CI 95%: 11. 8% a 26.8%), for passengers 20.3% (CI 95%: 11.8% a 31.2%), and for pedestrians 17.9% (CI 95%: 6.0% a 36. 9%). From patients with positive levels men had a prevalence of 21.2% (CI 95%: 14.9% a 27.5%). On the other hand women had lower rates, 11.8% (CI 95%: 2.6% a 20.9%).

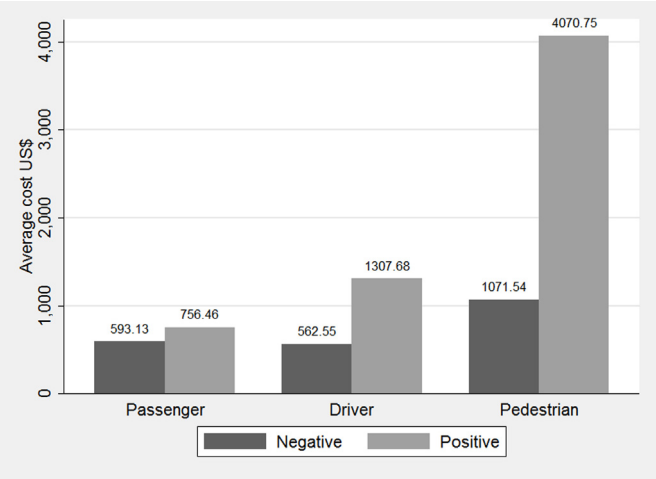
[1] Study: Prevalence of alcohol consumption and costs associated to traffic accidents in the city of Bogota. Project: Interventions targeted health program in PHC and reducing the burden of mental disorders generators greater chronicity and disability. (UT / PUJ and HUSI) colciencias code number: 501 253 730 902.

Table 1
Total cost of healthcare (mean, standard deviation, median and inter quartile range) in USD according to socio-demographic and injury information.

Variable	*n*	%	Mean	Sd	Median	IR
Total	268	100.0	877.7	1801	225.0	913.9
Age						
18–25	74	27.6	519.3	661.7	191.5	641.3
26–30	55	20.5	1147.8	2637.6	370.6	1171.7
31–45	75	28.0	905.7	1434.3	186.6	921.9
46–60	47	17.5	1074.6	2358.0	139.5	1204.8
61 or more	17	6.3	895.3	1469.2	130.1	1494.6
Gender						
Female	65	24.3	638.4	1182.2	190.1	377.2
Male	203	75.7	954.2	1954.0	255.0	1027.8
Ocupation						
Student	15	5.6	493.6	647.0	259.6	469.9
Employed	59	22.0	599.6	1111.5	139.5	518.5
Self-employed/independent	150	56.0	1116.9	2194.2	309.3	1312.5
Unemployed	10	3.7	631.4	1344.4	94.8	550.6
Retired or permanently disabled	3	1.1	817.2	814.7	687.0	1613.6
Homemaker	31	11.6	520.4	1052.0	145.5	337.0
Education						
None	20	7.5	1444.6	1974.8	542.9	1866.5
Primary	74	27.6	1004.7	2637.0	163.4	844.5
High school	118	44.0	808.4	1304.6	198.7	1093.9
Higher education	54	20.1	669.4	1176.2	216.8	503.6
No data	2	0.7	216.6	172.2	216.6	243.5

Variable	*n*	%	Mean	Sd	Median	IR
Road user group						
Passenger	93	34.7	661.6	1133.3	193.0	503.6
Driver	143	53.4	879.2	1830.0	231.8	1000.0
Pedestrian	32	11.9	1498.6	2869.3	289.4	1648.9
MAIS[a]						
1	36	13.4	73.5	76.1	50.5	29.2
2	104	38.8	218.1	276.5	119.8	159.2
3	80	29.9	925.9	1045.5	555.1	1267.0
4	33	12.3	1468.3	936.6	1241.3	1458.3
5	15	5.6	5824.3	4596.8	5510.1	3936.6
Affected region						
Thorax–abdomen	11	4.1	431.4	645.8	109.9	454.0
Head–neck	47	17.5	1162.3	1624.6	483.6	1544.2
Face	25	9.3	1219.7	2866.2	258.0	955.9
External injury	50	18.7	367.2	1069.3	101.8	89.7
Extremity–hip	135	50.4	940.6	1861.5	336.5	977.5
BrAC[b]						
Negative	175	65.3	639.8	1139.3	132.9	550.2
Positive	41	15.3	1443.0	2609.9	483.6	1845.1
No tested	52	19.4	1232.5	2573.2	472.8	1103.2

[a] Maximum abbreviated injury scale.
[b] Breath alcohol concentration.



Graph 1. Average cost USD according to BrAC results and road user group.

3.3. Costs

Average and median costs were estimated using the data obtained from billing information. These were divided according to different characteristics of the patients. Results are also shown in Table 1. Median and average costs were different, which is expected for positive asymmetric distributions associated to data involving costs. Average and median costs were estimated at 878 USD and 225 USD, respectively. Patients between 26 and 30 years of age had the highest levels for healthcare costs, with an average of 1148 USD and median of 371 USD. When costs are analyzed according to MAIS levels, it is observed that a positive correlation exists. As MAIS levels increase so does the median and average healthcare costs. Medical care costs are highest for pedestrians involved in road accidents.

3.4. Cost analysis according to BrAC tests

Data from patients who did BrAC tests was used ($n = 216$) in order to determine whether alcohol consumption affects medical care costs. For the remaining 52 patients it was not known if they had consumed alcohol, hence they were not included to avoid an inaccurate estimation.

Descriptive comparisons were held to determine whether attention costs were higher for patients with positive BrAC. Table 2 presents results of costs according to MAIS values. It shows that costs for patients with positive BrAC tend to have higher mean and median values, than costs for patients with negative BrAC. The exception is found for patients with MAIS = 4.

Costs are higher for patients who had positive BrAC. This is true for every road user group; drivers, passengers, and pedestrians. These results are shown in more detail in Graph 1. It shows how pedestrians with positive BrAC have an average cost (4071 USD), four times higher than those with negative BrAC (1072 USD).

Table 2
Total cost of healthcare (mean, standard deviation, median and inter quartile range) in USD according to BrAC and MAIS results.

	Negative						Positive					
MAIS	*n*	%	Mean	Sd	Median	IR	*n*	%	Mean	Sd	Median	IR
1	29	16.6	78.2	84.3	47.5	35.7	2	4.88	55.9	3.9	55.9	5.5
2	75	42.9	173.9	200.0	111.1	71.0	12	29.27	478.3	580.8	298.0	358.3
3	49	28.0	830.1	992.8	548.5	1113.6	15	36.59	1117.7	1493.1	488.8	1984.1
4	16	9.1	1717.7	1065.2	1514.7	1446.0	8	19.51	1304.1	880.8	1181.8	1150.4
5	6	3.4	4747.4	1507.2	4950.3	2241.1	4	9.76	6528.0	6108.2	5209.1	9725.7
Total	175	100	639.8	1139.3	132.9	550.2	41	100	1443.0	2609.9	483.6	1845.1

Table 3
Relative difference in the average cost of care of patients victims of traffic accidents. Univariate and multivariate analysis (216 patients that performed BrAC test).

Variable BrAC	Relative difference Univariate analysis	CI 95%	Relative difference multivariate analysis	CI 95%
Negative	1		1	
Positive	2.26*	1.20–4.23	1.66*	1.05–2.62
Age				
18–25	1		1	
26–30	1.87	0.94–3.71	1.04	0.68–1.60
31–45	1.92*	1.10–3.35	1.00	0.63–1.61
46–60	2.40*	1.10–5.20	1.30	0.74–2.27
61 or more	1.15	0.43–3.08	0.65	0.32–1.33
Gender				
Female	1		1	
Male	1.42	0.77–2.62	1.35	0.90–2.02
Education				
None	1		1	
Primary	0.60	0.23–1.58	0.69	0.36–1.31
High school	0.56	0.24–1.29	0.57	0.29–1.12
Higher education	0.54	0.20–1.42	0.7	0.32–1.50
Occupation				
Homemaker	1		1	
Student	1.42	0.55–3.68	0.9	0.37–2.18
Employed	1.71	0.74–3.95	0.81	0.38–1.71
Self-employed/Independent	2.99***	1.63–5.48	0.82	0.411–1.61
Unemployed	2.57	0.36–18.12	0.4	0.14–1.07
Retired or permanently disabled.	2.44	0.46–12.88	1.55	0.39–6.07
Road user group				
Passenger	1		1	
Driver	1.12	0.68–1.83	1.05	0.72–1.54
Pedestrian	2.57*	1.10–5.99	0.89	0.54–1.47
MAIS				
1	1		1	
2	2.81***	1.74–4.55	2.7***	1.71–4.27
3	11.69***	7.13–19.16	10.17***	6.31–16.37
4	20.57***	13.02–32.51	22.46***	13.44–37.54
5	71.10***	39.14–129.15	76.19***	38.04–152.60

MAIS: maximum abbreviated injury scale; BrAC: breath alcohol concentration.
* $p < 0.05$.
*** $p < 0.001$.

Table 3 shows the results for the analysis of alcohol consumption as an incremental factor in healthcare costs. Univariate analysis shows that alcohol consumption causes the cost of attention to be 2.26 times higher (CI 95%: 1.20–4.23) than the costs for patients with negative BrAC. Similarly, age in some cases, denotes a factor leading to higher costs of healthcare. For people in the age groups of 31–45 years and 46–60 years have values 1.92 times (95% CI: 1.10–3.35) and 2.40 times (95% CI: 1.10–5.20) higher compared to patients aged 18–25 years. Another factor that is statistically significant is the occupation of the injured person, as people engaged in self-employed activities have cost 2.99 times higher (95% CI: 1.63–5.48) compared to those engaged in household chores.

As expected, the severity of the trauma as measured by the MAIS scale shows a statistically significant relationship with increasing costs. This ratio is increased at all levels of severity of the trauma, exhibiting a value between 2.81 times (MAIS = 2) to 71.10 times (MAIS = 5) greater than a trauma with MAIS = 1.

Finally when the multivariate analysis was performed, a model adjusted for socio-demographic covariates and MAIS index was applied. Adjusted results show that alcohol consumption is an incremental factor for healthcare costs of nearly 1.66 times (95% CI: 1.05–2.62). As in the univariate analysis, the severity of the injury is another factor that increases healthcare cost, while the socio-demographic characteristics do not show statistical significance.

4. Discussion

This analysis helps to explain the relationship between traffic accidents and alcohol consumption in intermediate cities like Sincelejo (Colombia). Descriptive results show that alcohol consumption can imply a higher risk of suffering severe injuries [9,19]. It also shows that this risk does not only apply to drivers, but also for pedestrians who were the most severely affected [20,21]. Results are consistent with previous studies that show that men are the main victims of road accidents [5,7,22], and people between 18 and 45 years old are greatly affected [11,22,23]. This group of people tends to behave in a more reckless manner and take higher risks, by not following traffic laws, speeding, or driving under the influence of alcohol [24].

Alcohol consumption is identified as a variable that increases the amount of resources used in direct medical care [10,25]. Both types of analysis (univariate and multivariate) show how alcohol consumption generates a multiplier effect over healthcare costs. The multivariate analysis shows this in a more specific manner. Characteristics of victims like age, education level, and occupation,

may cause some variations over costs. The effect can be higher, if it is taken into account that results may be underestimated as 52 patients refused to take BrAC tests [26].

The results of the study suggest that it is relevant to implement integrated prevention measures among state authorities and private institutions such as commercial establishments and alcohol beverage industries [27]. These campaigns should be directed not only to drivers, but to the population in general because passengers and pedestrians are also affected by traffic accidents involving alcohol consumption.

To obtain more precise results it is recommended to conduct the study for a larger period of time. This study may include under estimated costs for healthcare, as patients included in the study required prolonged medical attention after being discharged. These extra costs unaccounted in the study represent underestimations. Therefore, conducting a longer study would probably give more precise data about health care costs associated with traffic accidents and their relationship with alcohol consumption.

It is also important to measure the impact of the implementation of legislation in Colombia and intermediate cities like Sincelejo. A clear example can be found in Colombian law 1696 of December 19th, 2013 [28]; this law stipulates that monetary sanctions would be applied for drivers who present a blood alcohol concentration higher to 0.20 g/L. Even though this law was present during the study period, it did not have a considerable or high impact.

Conflict of interests

None.

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References

OMS. | Informe sobre la situación mundial de la seguridad vial 2013 [Internet]. WHO. [Cited 2013 Nov 25]. Available from: http://www.who.int/violence_injury_prevention/road_safety_status/2013/report/es/.

Takanishi, D.M., Yu, M., Morita, S.Y., [2]. Increased fatalities and cost of traumatic injuries in elderly pedestrians in Hawaii: a challenge for prevention and outreach. Asia Pac. J. Public Health 4, 327–339.

Elvik, R., [3]. How much do road accidents cost the national economy? Accid. Anal. Prev. 32 (6), 849–851.

García-Altés, A., Puig-Junoy, J., [4]. What is the social cost of injured people in traffic collisions? An assessment for catalonia. J. Trauma 70 (3), 744–750.

Nguyen, H., Ivers, R.Q., Jan, S., Martiniuk, A.L.C., Li, Q., Pham, C., [5]. The economic burden of road traffic injuries: evidence from a provincial general hospital in Vietnam. Inj. Prev. 19 (2), 79–84.

Haghparast-Bidgoli, H., Saadat, S., Bogg, L., Yarmohammadian, M.H., Hasselberg, M., [6]. Factors affecting hospital length of stay and hospital charges associated with road traffic-related injuries in Iran. BMC Health Serv. Res. 22 (13), 281.

Sommers, B.D., Fargo, J.D., Lyons, M.S., Shope, J.T., Sommers, M.S., [7]. Societal costs of risky driving: an economic analysis of high-risk patients visiting an urban emergency department. Traffic Inj. Prev. 12 (2), 149–158.

Zeckey, C., Dannecker, S., Hildebrand, F., Mommsen, P., Scherer, R., Probst, C., et al., 2011May. Alcohol and multiple trauma—is there an influence on the outcome? Alcohol 45 (3), 245–251.

Stübig, T., Petri, M., Zeckey, C., Brand, S., Müller, C., Otte, D., et al., 2012Nov. Alcohol intoxication in road traffic accidents leads to higher impact speed difference, higher ISS and MAIS, and higher preclinical mortality. Alcohol 46 (7), 681–686.

Gómez-Restrepo, C., Rondón, M., Ruiz, Á., Lozano, J.M., Guzmán, J., Macías, F., [10]. Niveles de alcohol en sangre y somnolencia en conductores estudiados en simuladores: un metaanálisis. Rev. Colomb. Psiquiatr. 40 (2), 229–243.

L. Moreno, S L. Forensis, 2012, Instituto Nacional de Medicina Legal y Ciencias 2013.

Bocarejo, J.P., Velásquez, J.M., Díaz, C.A., [12]. Desarrollo de Metodología de Valoración del Costo Económico de la Accidentalidad Vial en Colombia y Cálculo para el periodo 2008–2010. Universidad de los Andes-Fondo de prevención, Bogotá D.C, pp. 2010.

Bond, J., Ye, Y., Cherpitel, C.J., Room, R., Rehm, J., Borges, G., et al., 2010Jun 1. The relationship between self-reported drinking and BAC level in emergency room injury cases: is it a straight line? Alcohol Clin. Exp. Res. 34 (6), 1118–1125.

Fiorentino, D.D., [14]. Validation of sobriety tests for the marine environment. Accid. Anal. Prev. 43 (3), 870–877.

Breusch, T.S., Pagan, A.R., [15]. A simple test for heteroscedasticity and random coefficient variation. Econometrica 47 (5), 1287–1294.

White, H., [16]. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica 4, 817–838.

Manning, W.G., Mullahy, J., [17]. Estimating log models: to transform or not to transform? J. Health Econ. 20 (4), 461–494.

Basu, A., [18]. Extended generalized linear models: simultaneous estimation of flexible link and variance functions. Stata J. 5 (4), 501–516.

Cook, A., Weddle, J., Baker, S., Hosmer, D., Glance, L., Friedman, L., et al., 2014. A comparison of the injury severity score and the trauma mortality prediction model. J. Trauma Acute Care Surg. 76 (1), 47–52 discussion 52–53.

Åstrøm, A.N., Moshiro, C., Hemed, Y., Heuch, I., Kvåle, G., [20]. Perceived susceptibility to and perceived causes of road traffic injuries in an urban and rural area of Tanzania. Accid. Anal. Prev. 38 (1), 54–62.

Tarko, A., Azam, M.S., [21]. Pedestrian injury analysis with consideration of the selectivity bias in linked police-hospital data. Accid. Anal. Prev. 43 (5), 1689–1695.

Czech, S., Shakeshaft, A.P., Byrnes, J.M., Doran, C.M., [22]. Comparing the cost of alcohol-related traffic crashes in rural and urban environments. Accid. Anal. Prev. 42 (4), 1195–1198.

Horwood, L.J., Fergusson, D.M., [23]. Drink driving and traffic accidents in young people. Accid. Anal. Prev. 32 (6), 805–814.

Butters, J., Mann, R.E., Wickens, C.M., Boase, P., [24]. Gender differences and demographic influences in perceived concern for driver safety and support for impaired driving countermeasures. J. Saf. Res. 43 (5–6), 405–411.

Popova, S., Patra, J., Sarnocinska-Hart, A., Gnam, W., Mann, R.E., Rehm, J., [25]. Alcohol-related laws and avoidable burden and its costs due to motor vehicle collisions in Canada. Contemp Drug Probl. 38 (3), 467–485 Fall.

Vanlaar, W., [26]. Drink driving in Belgium: results from the third and improved roadside survey. Accid. Anal. Prev. 37 (3), 391–397.

Pantani, D., Sparks, R., Sanchez, M., Pinsky, I., [27]. Responsible drinking programs and the alcohol industry in Brazil: Killing two birds with one stone? Soc. Sci. Med. 75 (8), 1387–1391.

Congreso de la República, 1696, December 19, 2013