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MORTALITY CAUSED BY TRAFFIC ACCIDENTS IN COLOMBIA. COMPARISON WITH OTHER COUNTRIES

José Domingo Alarcón (1,2), Ignasi Gich Saladich (3,4), Lisímaco Vallejo Cuellar (5,6), Angela M. Ríos Gallardo (5), Carlos Montalvo Arce (1), Xavier Bonfill Cosp (3,4)

(1) Universidad Surcolombiana. Grupo de Investigación Desarrollo Social, Salud Pública y Derechos Humanos. Neiva. Colombia.

(2) Doctoral Program in Biomedical Research Methodology Investigation and Public Health. Universitat Autònoma de Barcelona. Barcelona. Spain.

(3) Centro Cochrane Iberoamericano, Instituto de Investigación Biomédica (IIB Sant Pau). CIBER Epidemiología y Salud Pública (CIBERESP). Barcelona. Spain.

(4) Universitat Autònoma de Barcelona. Barcelona. Spain.

(5) Universidad Surcolombiana. Grupo de investigación Dneuropsy. Neiva. Colombia.

(6) Sports Science Research Group. Institut Nacional d'Educació Física de Catalunya, Universitat de Barcelona. Barcelona. Spain.

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ABSTRACT

Background: Traffic accidents (TA) are a global problem with mortality of 1.25 million each year. The objective of this study was to compare adjusted mortality rates (AMR) by AT of Colombia, with Spain and the United States (US). The selection is justified because Colombia is a country with less development in road safety, Spain a nation that has adhered to European guidelines and US for having little adherence to international guidelines.

Methods: A descriptive cross-sectional study was carried out for five-year periods, by calculating the AMRs by the direct method of standardization according to sex and age groups, as well as the adjustment of the motorization index. The mean values, the 95% confidence interval for each country and the relative change between the periods studied were calculated.

Results: The AMR of periods P1 and P2 in all countries decreased significantly ($p < 0.005$). In periods P2 and P3 also decreased significantly in Spain, by 52.0% ($p = 0.010$), and in the US, by 23.6% ($p = 0.001$), while in Colombia the difference of 4.0% it was not significant ($p = 0.724$). Spain stood out for the reduction in mortality (P1-P3), by 69.0%.

Conclusions: Colombia presented a less favorable evolution of mortality due to AT than Spain and the US. Men aged 15 to 44, motorcyclists and cyclists were the most committed. The TAs are a public health problem that Colombia has raised and must adapt to its reality those successful measures in other countries.

Key words: Traffic accidents, Mortality, Comparative study.

RESUMEN

Mortalidad por accidentes de tráfico en Colombia. Estudio comparativo con otros países

Fundamentos: Los accidentes de tráfico (AT) son un problema mundial con mortalidad de 1,25 millones cada año. El objetivo de este estudio fue comparar tasas ajustadas de mortalidad (TAM) por AT de Colombia, con España y Estados Unidos (EEUU). La selección se justifica por ser Colombia un país con menor desarrollo en seguridad vial, España una nación que se ha adherido a directrices Europeas y EEUU por tener poca adherencia a directrices internacionales.

Métodos: Se realizó un estudio descriptivo de corte transversal por quinquenios, mediante el cálculo de las TAM por el método directo de estandarización según sexo y grupos de edad, así como el ajuste del índice de motorización. Se calcularon los valores medios, el intervalo de confianza al 95% por cada país y el cambio relativo entre los periodos estudiados.

Resultados: Las TAM de los periodos P1 y P2 en todos los países disminuyeron significativamente ($p < 0.005$). En los periodos P2 y P3 también disminuyeron significativamente en España, en un 52,0% ($p = 0,010$), y en EU, en un 23,6% ($p = 0,001$), mientras que en Colombia la diferencia de 4,0% no fue significativa ($p = 0,724$). Destacó España por la reducción de su mortalidad (P1-P3), en un 69,0%.

Conclusiones: Colombia presentó una evolución menos favorable de mortalidad por AT que España y EEUU. Los hombres de 15 a 44 años, motociclistas y ciclistas fueron los más comprometidos. Los AT son un problema de salud pública que tiene planteado Colombia y debe adaptar a su realidad aquellas medidas exitosas en otros países.

Palabras clave: Accidentes de tráfico, Mortalidad, Estudio comparativo.

Correspondence

José Domingo Alarcón.
Departamento Medicina Social y Preventiva
Universidad Surcolombiana
Calle 9 Carrera 14
Neiva, Huila, Colombia
jodoma@gmail.com

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INTRODUCTION

Mortality from traffic accidents (TA) is a public health problem globally which leaves human losses estimated at 1.25 million each year, being persons aged between 15 to 44 years with the most mortality^(1,2). Factors such as: inadequate speed; alcohol and drug consumption; failure to comply with the priority; tiredness or sleep; distraction⁽³⁾; failure to keep distance between vehicles; not knowing how to drive properly or mechanical failures⁽²⁾; among others, there are still fundamental factors in the TA genesis.

Half of the people who die for this cause all over the world are “vulnerable road users” i.e. pedestrians, cyclists and motorcyclists. If measures are not implemented to avoid this, it is expected that by 2030 the TAs will become the seventh leading cause of death worldwide⁽¹⁾. Therefore, the decrease in accidents associated with traffic represents a challenge for public health worldwide⁽¹⁾.

The selection of these countries was done in the interest of comparing TA mortality in Colombia with countries, such as Spain which has for several years adhered to the principles of the European Union and with the United States of America (USA), a developed country, which has fallen behind in road safety, according to the Research Council on the National Transportation⁽⁴⁾. In addition, the three countries share a high coverage of their records of mortality⁽⁵⁾ (90% Colombia, Spain and the United States with 100%), which guarantees a good comparability between them. For the first five years, of the XXI century Spain, presented an AMR of 11.6 per 100 000 inhabitants, while the United States showed 14.5 per 100 000 inhabitants and Colombia had 15.9 per 100 000 inhabitants in a country where the traffic accidents (TA) constitute a major social and public health problem placing it as the second cause of violent death after homicides in the year 2015⁽²⁾.

The deaths from TAs represent 2.5 % of the Gross National Product of the expenses in health and it is foreseen, being based on the

projections for 2020 from the motorization index that the mortality in Colombia will increase especially in the users of motorbikes⁽⁶⁾. It is relevant to bear in mind close to half of the victims are young people⁽⁷⁾. According to the World Bank, a person at the wheel, in Colombia, has 4 times more probabilities of dying in a traffic accident than does a driver in Spain or Great Britain⁽⁸⁾. So, Colombia is one of the 68 countries that presents with increases in the traffic accident deaths since 2010, removing the country increasingly away from the goal of “The Decade of Action for Road Safety 2011–2020”⁽²⁾.

Our hypothesis is that the countries with a better implementation of strategies of road safety have major reductions in their mortality. The target of this study was to compare the TA mortality in Colombia between the years 2000 to 2014 with that of Spain and the USA.

SUBJECTS AND METHODS

There was a descriptive study of a cross section of the TA mortality for three countries: Colombia, Spain and the USA corresponding to the quinquenniums P1=2000-2004, P2=2005-2009, P3=2010-2014. The information about the population and the deaths for TA that happened in the period 2000-2014 came from the following official sources from every country: Colombia, from the National Institute of Legal Medicine and Forensic Sciences (www.medicinalegal.gov.co/) and the Road Prevention Fund (www.fpv.org.co/); Spain, from the General Direction of Traffic “DGT” (www.dgt.es/) and of the Statistical Yearbook published for the National Institute of Statistics of Spain “INE” (www.ine.es/prodyser/pubweb/anuarios_mnu.htm) and in the USA by the Fatality Analysis Reporting System, FARS (NHTSA) (www.nhtsa.gov/). The mortality rate (MR) of the three countries was calculated based on the mortality reports from 30 days after the accident⁽⁹⁾. Two indicators of exhibition were also obtained from the traffic accidents: 1) the motorization index and the vehicle parking lot. The motorization Index was defined as the

number of vehicles motorized by inhabitant in a place and at a given period⁽¹⁰⁾.

From the obtained information of the previous sources a calculation was made of the exact adjusted mortality rates (AMR) in which the direct method of standardization of mortality rates in Colombia, Spain and the USA were adjusted for the general population and by sex, according to the world population standard in 2007 (half of the period of study) obtained from the United Census Bureau of the Department of Commerce of the USA (U.S. Department of Commerce 2015). Later the adjustments were standardized according to sex and age groups given by module of Rate Adjustment from the statistical Software EPIDAT 4.1 of Xunta de Galicia-OPS⁽¹¹⁾. Also a rate adjustment was made according to the scrap yard/parking lot from every country; a calculation was made regarding the reason for the TA mortality based on the number of vehicles registered by every country (it was named the TA motorization mortality rate), formulated by means of the TA mortality rate for 100,000 inhabitants over the motorization index for 100 000 inhabitants, in such a way that the population remained considered for both calculations.

The average values were calculated for every quinquennium, as well as for the confidence interval of 95 % (IC95 %), of the AMR

from every country. For the different age groups the specific rate was calculated for each one of them by country. The percentage rate was analyzed by means of the relative change calculation of the adjusted and specific rates among the three quinquenniums studied, P1, P2 and P3: % Relative Change (RC) = $(P_f - P_i) / P_i \times 100$ where P_f is the final period and P_i is the initial period in the comparison. The significant differences were established ($p < 0.05$) in the three compared periods (P1 vs. P2, P2 vs. P3 and P1 vs. P3) using post hoc Tukey range tests in ANOVA. The brute TA mortality rates for the three countries were proportioned based on public route users (pedestrians, motorcyclists and cyclists) since the primary information from every country was not available the adjusted mortality rate (AMR) was not possible to obtain. This analysis was realized by the statistical packet IBM-SPSS (V23.0).

RESULTS

An observance was made about the periods P1-P2 in the three countries that the AMR had diminished significantly: in Colombia (20.8%); in Spain (35.3%) and in the USA (12.4%); ($p=0.001$; $p=0.011$; $p=0.033$ respectively) (tables 1 and 2, figure 1); equally the decrease was significant in the three countries when they were compared globally for the periods P1-P3 ($p < 0.05$). Nevertheless, in

Table 1
Exact traffic accident mortality rates according to general population and sex for Colombia, Spain and the United States. Periods: P1=2000-2004, P2=2005-2009 And P3=2010-2014

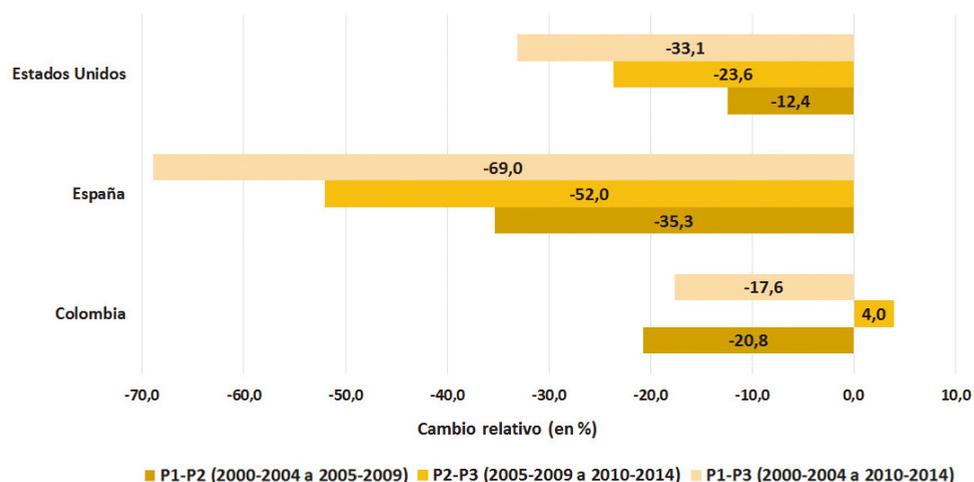
Type of Population	Country	Exact Mortality Rates and Confidence Intervals					
		P1	CI 95%	P2	CI 95%	P3	CI 95%
General Population	Colombia	15.94	(15.52 – 16.36)	12.59	(12.24 – 12.94)	13.16	(12.81 – 13.50)
	Spain	11.57	(11.23 – 11.90)	7.48	(7.21 – 7.75)	3.63	(3.45 – 3.81)
	The USA	14.48	(14.29 – 14.66)	12.67	(12.59-12.75)	9.66	(9.53 – 9.78)
Men	Colombia	25.41	(24.67 – 26.15)	20.64	(20.01 – 21.27)	21.56	(20.96 – 22.15)
	Spain	17.76	(17.17 – 18.35)	11.28	(10.83 – 11.73)	5.58	(5.25 – 5.90)
	The USA	19.94	(19.70 – 20.17)	17.93	(17.75 – 18.11)	13.86	(13.67 – 14.05)
Women	Colombia	6.44	(6.06 – 6.82)	5.24	(4.91 – 5.56)	5.06	(4.75 – 5.37)
	Spain	5.42	(5.08 – 5.75)	3.22	(2.93 – 3.50)	1.69	(1.52 – 1.85)
	The USA	8.90	(8.71 – 9.08)	7.31	(7.21- 7.40)	5.64	(5.52 – 5.75)

Table 2
Percentage of relative traffic accident mortality change according to general population and sex for Colombia, Spain and the United States.
Periods: p1=2000-2004, p2=2005-2009 and p3=2010-2014

Type of Population	Country	% Relative Change*		
		P1 & P2	P2 & P3	P1 & P3
General Population	Colombia	-20.8 (0.001)	4.0 (0.724)	-17.6 (0.005)
	Spain	-35.3 (0.011)	-52.0 (0.010)	-69.0 (0.000)
	The USA	-12.4 (0.033)	-23.6 (0.001)	-33.1 (0.000)
Men	Colombia	-18.9 (0.005)	4.4 (0.743)	-15.4 (0.020)
	Spain	-36.2 (0.001)	-50.4 (0.002)	-68.4 (0.000)
	The USA	-9.5 (0.077)	-22.8 (0.001)	-30.2 (0.000)
Women	Colombia	-18.8 (0.004)	-1.9 (0.888)	-20.3 (0.002)
	Spain	-40.7 (0.000)	-46.9 (0.001)	-68.5 (0.000)
	The USA	-16.9 (0.003)	-24.3 (0.005)	-37.1 (0.000)

* "p" values in parenthesis

Figure 1
Comparison of relative change in the adjusted mortality rates for traffic accidents in the general population in Colombia, Spain and the United States for the periods: 2000-2004, 2005-2009 & 2010-2014



Note 1: P1: Period 2000 to 2004; P2: Period 2005 to 2009; P3: Period 2010 to 2014.

Note 2: The relative change negative values represent a reduction in mortality rates for road traffic between the countries in general population and according to periods.

the period P2-P3, Colombia experienced an increase in its AMR by 4 %, which contrasted with the reduction of the 52 % that Spain experienced and of 23.6 % that the USA experienced in the same period (figure 1).

In the comparison for genre, the AMR for men experienced a significant decrease in periods P1-P2: Colombia with 18.9%; Spain with 36.2% and the USA with 9.5%. In the period P1-P3 the global AMR decrease in Spain

was 68.4% which passed from 11.6 to 3.6 for each 100,000 inhabitants ($p=0.000$) (Table 1, Table 2 and Figure 2a) whereas in the USA the reduction was 0.2% and in Colombia it was 15.4%. Nevertheless, in the period P2-P3 the reduction that was observed in Spain and the USA (50.4 % and 22.8 %, respectively) contrasted with the increase of 4.4 % in Colombia (tables 1 and 2, figure 2a).

For the women, the comparison between the periods P1-P2 showed a significant reduction of the AMR: Spain reduced by 40.7 %; followed by Colombia with 18.8 % and the USA with 16.9 % (Table 1, Table 2 and Figure 2b). In the comparison for the periods P1-P3, the three countries significantly reduced their AMR but Spain stood out with the highest reduction rate at 68.5 %, and passed from 5.4 to 1.7 per 100 000 inhabitants ($p=0.000$). In the period P2-P3, the three countries reduced their AMR although the proportions were very distinct: Spain with 49.9%; The USA with 24.3% and Colombia in scarcely 1.9%.

The AMR diminished significantly in the three countries and in all the age groups in the periods P1-P2 ($p < 0.05$), except in the group from 25 to 34 years in Colombia, which only diminished 5.9 % and from 18.8 to 17.7 per 100 000 inhabitants ($p=0.654$), and in the USA, which diminished 5.2 % (from 17.3 to 16.4; $p=0.452$) (tables 3 and 4). Between the periods P1-P3 the AMR had decreased all the countries and in all age groups with significant differences ($p=0.005$), except in the group from 15 to 24 years in Colombia, which diminished by only 8.3 %, from 16.9 to 15.5 per 100 000 inhabitants ($p=0.420$) and in the group from 25 to 34 years of age where the AMR increased by 0.5 %, passing from 18.8 to 18.9 ($p=0.996$). This minor mortality reduction in Colombia is due to the fact that in the period P2-P3 it had produced an increase in the AMR in both age groups, it was 18.3 % in that of 15 to 24 years and 6.8 % in that group from 25 to 34 years (figure 2a and 2b).

When the groups were compared by age genre quite different results were obtained for

the men and the women and according to the age group. Both in Spain and in the USA a reduction of the AMR was demonstrated in all the groups for both sexes in all the periods. In Colombia, on the other hand, for the men aged from 15 to 24 years, from 25 to 34 years and from 25 to 34 years there was a significant increase in the period P2-P3 (table 5, figure 3a) of the 18.3 %, 6.8 % and 7.6 %, respectively. For the women in the same age groups in Colombia, there were no increases however they presented a reduction or stabilization in their AMR (table 4, figure 3b).

As for the motorization index, in the period P1-P3 Colombia showed an increase of 243.1%, (passing from 70 to 240.2 for 1.000 inhabitants) which was much more than in Spain and the USA, whereas Spain increased 13,1% (from 573.7 to 648.9 for 1.000 inhabitants) and in the USA 12.7 %. (from 772 to 870.7 for 1.000 inhabitants). The AMR, in Colombia, according to the motorization index showed 182, 96 and 56 deaths for every 100.000 vehicles in the periods 1, 2 and 3 respectively; these rates for the USA were 18, 15 and 11, whereas for Spain, they were 19, 11 and 5 in the same respective periods.

On having analyzed the brute mortality rate (BMR) of every country, for public route users, in the period 2000-2014, Spain showed an outstanding reduction of 68.2 % in pedestrian mortality passing from 2.2 to 0.7 per 100.000 inhabitants and Colombia followed with a reduction of 44.8 %, passing from 6.7 to 3.7. As for motorcyclists, Spain equally showed a mortality reduction of 19.0 % and a rate variation from 2.1 to 1.7. On the other hand, Colombia and the USA showed increased mortality: The USA increased by 40% (from 1.0 to 1.4 per 100 000) and Colombia increased by 38.9 % (from 3.6 to 5.0). Among the cyclists, Spain and the USA did not present changes in the same period (0.2 per 100 000 inhabitants) whereas Colombia emphasized a mortality increase of 133.3 %, passing from 0.3 to 0.7 per 100 000 inhabitants (table 6).

Figure 2a
Comparison of relative changes in exact adjusted traffic accident mortality rates in men in Colombia, Spain and the United States. Periods 2000-2004, 2005-2009 & 2010-2014

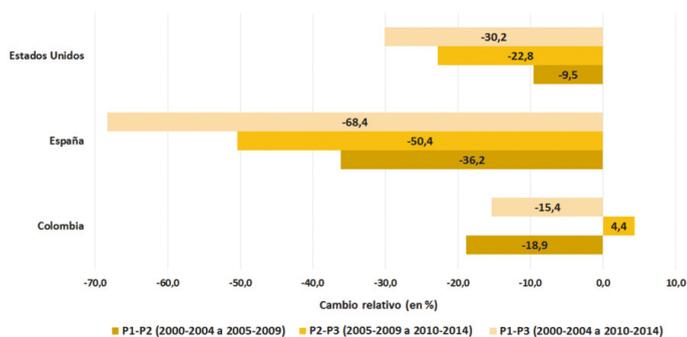
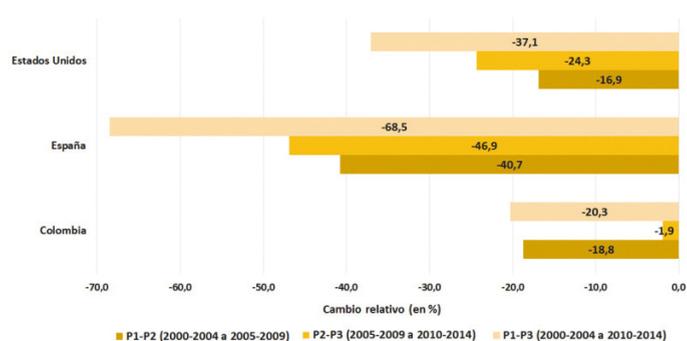


Figure 2b
Comparison of relative changes in exact adjusted traffic accident mortality rates in women in Colombia, Spain and the United States. Periods 2000-2004, 2005-2009 & 2010-2014



Note: P1: Period 2000 - 2004; P2: Period 2005-a 2009; P3: Period 2010 - 2014

Note 2: Negative values of the relative change represent a decrease in mortality rates for road traffic between the countries, according to periods and by gender.

Table 3
Adjusted mortality rates for traffic accidents according to age groups in Colombia, Spain and the United States. Periods: P1=2000-2004, P2=2005-2009 And P3=2010-2014

GROUPS (age)	Country	Adjusted Mortality Rates and Confidence Intervals					
		P1	Country	P2	CI 95%	P3	CI 95%
< 15	Colombia	4.2	(3.6 – 4.6)	2.7	(2.4 – 3.0)	2.3	(1.8 – 2.7)
	Spain	2.5	(2.0 – 3.0)	1.5	(0.9 – 2.0)	0.7	(0.4 – 1.0)
	The USA	4.3	(4.0 – 4.5)	3.2	(2.4 – 3.9)	2.2	(1.8 – 2.4)
15 - 24	Colombia	16.9	(13.9 – 19.9)	13.1	(11.9 – 14.1)	15.5	(13.6 – 17.3)
	Spain	20.4	(18.5 – 22.2)	12.9	(8.9 – 16.6)	4.9	(2.7- 7.0)
	The USA	25.5	(24.8 – 26.1)	21.7	(17.5 – 25.9)	14.9	(13.8 – 15.6)
25 - 34	Colombia	18.8	(15.2 – 22.3)	17.7	(15.6 – 19.8)	18.9	(18.2 – 19.5)
	Spain	16.3	(14.8 – 17.8)	10.6	(7.5 – 13.7)	4.6	(3.1 – 5.9)
	The USA	17.3	(17.1 – 17.4)	16.4	(16.4 – 18.6)	13.5	(12.7 – 13.8)
35 - 44	Colombia	17.4	(14. – 20.)	13.1	(12.3 – 13.7)	14.1	(13.5 – 14.6)
	Spain	12.6	(10.9 – 14.3)	8.2	(6.1 – 10.3)	4.1	(2.8 – 5.4)
	The USA	15.1	(14.7 – 15.4)	13.8	(11.9 – 15.5)	10.9	(10.0 – 11.3)
> 45	Colombia	25.4	(21.6 – 29.4)	19.4	(18.4 – 20.3)	19.2	(18.6 – 19.6)
	Spain	11.7	(10.2 – 13.1)	7.9	(6.2 – 9.6)	5.0	(4.3 – 5.6)
	The USA	15.5	(15.4 – 15.6)	13.9	(12.3 – 15.5)	11.1	(9.9 – 12.3)

Table 4
Percentage of relative traffic accident mortality change for age groups in Colombia, Spain and the United States. Periods: P1=2000-2004, P2=2005-2009 And P3=2010-2014

Age Groups	Country	% Relative Change*		
		P1 & P2	P2 & P3	P1 & P3
< 15 years	Colombia	-35.7 (0.000)	-14.8 (0.210)	-45.2 (0.000)
	Spain	-40.0 (0.001)	-53.3 (0.011)	-72.0 (0.000)
	The USA	-25.6 (0.001)	-31.3 (0.002)	-48.8 (0.000)
15 – 24 years	Colombia	-22.5 (0.010)	18.3 (0.105)	-8.3 (0.420)
	Spain	-36.8 (0.000)	-62.0 (0.000)	-76.0 (0.000)
	The USA	-14.9 (0.032)	-31.3 (0.000)	-41.6 (0.000)
25- 34 years	Colombia	-5.9 (0.654)	6.8 (0.606)	0.5 (0.996)
	Spain	-35.0 (0.001)	-56.6 (0.000)	-71.8 (0.000)
	The USA	-5.2 (0.452)	-17.7 (0.002)	-22.0 (0.000)
35 - 44 years	Colombia	-24.7 (0.001)	7.6 (0.462)	-19.0 (0.005)
	Spain	-34.9 (0.001)	-50.0 (0.001)	-67.5 (0.000)
	The USA	-8.6 (0.091)	-21.0 (0.001)	-27.8 (0.000)
> 45 years	Colombia	-23.6 (0.001)	-1.0 (0.978)	-24.4 (0.000)
	Spain	-32.5 (0.000)	-36.7 (0.003)	-57.3 (0.000)
	The USA	-10.3 (0.042)	-20.1 (0.001)	-28.4 0.000

* “p” value in parenthesis

Figure 3a
Comparison of relative change in the adjusted mortality rates
for traffic accidents in Colombia according to men aged:
15 - 24, 25 - 34 & 35 - 44 years in the periods: 2000-2004, 2005-
2009 & 2010-2014

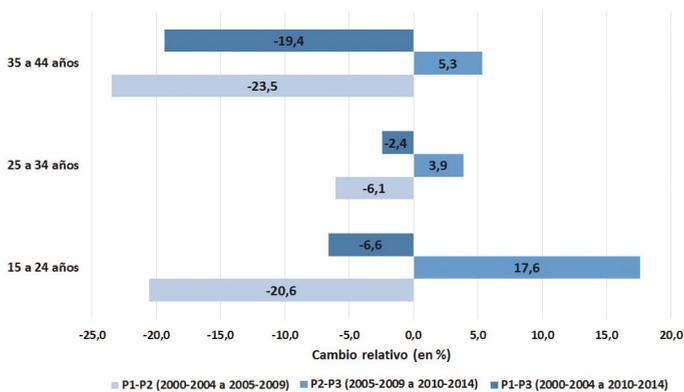
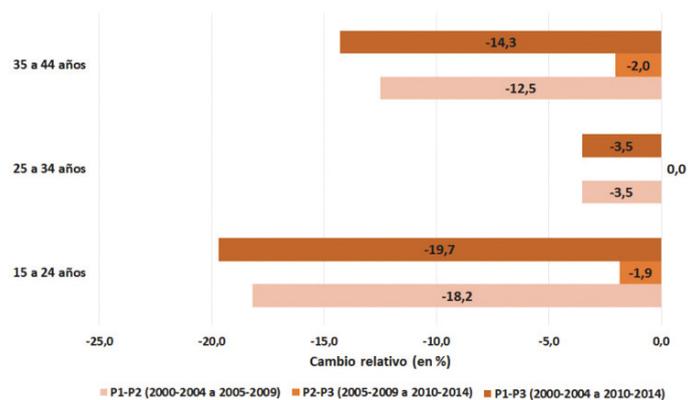


Figure 3b
Comparison of relative change in the adjusted mortality rates
for traffic accidents in Colombia according to women aged:
15 - 24, 25 - 34 & 35 - 44 years in the periods: 2000-2004, 2005-
2009 & 2010-2014



Note: P1: Period 2000 - 2004; P2: Period 2005 - 2009; P3: Period 2010 - 2014.

Note 2: The negative values of relative change represent a decrease in the traffic accident mortality rates between the countries according to the age groups and periods.

Table 5
Brute mortality rate (for 100,000 inhabitants) for traffic accidents and relative change percentage for pedestrians, motorcyclists and cyclists in Colombia, Spain and the United States. Period 2000-2014

COUNTRY	PEDESTRIANS			MOTORCYCLISTS			CYCLISTS		
	2000	2014	% Relative Change	2000	2014	% Relative Change	2000	2014	% Relative Change
Colombia	6.7	3.7	-44.8	3.6	5.0	38.9	0.3	0.7	133.3
Spain	2.2	0.7	-68.2	2.1	1.7	-19.0	0.2	0.2	0.0
The USA	1.7	1.5	-11.8	1.0	1.4	40.0	0.2	0.2	0.0

Tabla 6
Adjusted mortality rate for traffic accidents in Colombia according to age groups from: 15-24, 25- 34 & 35- 44 years according to sex. Periods 2000-2004, 2005-2009 & 2010-2014

Type of Population		Adjusted Mortality Rates ¹			% Relative Change ²		
		P1 2000-2004	P2 2005-2009	P3 2010-2014	P1 & P2	P2 & P3	P1 & y P3
Men	15-24	27.2 (21.84 – 32.66)	21.6 (19.71 – 3.53)	25.4 (22.01 – 8.73)	-20.6 (0,035)	17.6 (0.176)	-6.6 (0.621)
	25-34	33.0 (25.85 – 40.14)	31.0 (28.19 – 3.79)	32.2 (30.86 – 3.46)	-6.1 (0,661)	3.9 (0.870)	-2.4 (0.926)
	35-44	29.4 (24.38 – 34.56)	22.5 (20.63 – 4.46)	23.7 (23.19 – 4.17)	-23.5 (0,002)	5.3 (0.738)	-19.4 (0.009)
Women	15-24	6.6 (5.41 – 7.78)	5.4 (4.69 – 6.13)	5.3 (4.82 – 5.69)	-18.2 (0,044)	-1.9 (0.929)	-19.7 (0.023)
	25-34	5.7 (4.73 – 6.49)	5.5 (4.36 – 6.55)	5.5 (4.95 – 6.02)	-3.5 (0,859)	0.0 (0.996)	-3.5 (0.859)
	35-44	5.6 (4.73 – 6.49)	4.9 (4.53 – 5.22)	4.8 (4.10 – 5.43)	-12.5 0,112	-2.0 (0.933)	-14.3 (0.061)

¹ Confidence Intervals in parenthesis to 95% ; “p” value in parenthesis

DISCUSSION

The results of this study demonstrate that three countries presented with an evolution that clearly differentiated their TA mortality rates. The results from Spain proved to be outstanding by presenting with the highest global reduction. The decrease is observed in every quinquennium, in both sexes and for all the age groups. The USA equally presents an important reduction, also with decreases from period to period, in both sexes and for all the age groups although during the first period the reduction among the men was not significant not either in the group of 25 to 34 years.

Therefore, the obtained results are really worrying so whereas the mortality for traffic accidents diminishes in a progressive way in countries such as Spain and the USA, in Colombia, after some promising information at the beginning of the century, the final information is quite negative. In effect, instead of continuing with a decreasing tendency, parallel to that of the other two countries, Colombia showed an increase in the mortality rate among the young men and more specifically still, in the age group from 15 to 24 years where the young men are eligible for driving. These results coincide with similar studies conducted by the European Union, the OMS, the OPS, the World Bank and the Inter-American Development Bank^(12,13,14,15,16) and in Colombia, with the studies of different institutions that have identified this situation as a serious public health problem^(2,7).

The unequal or negative evolution of traffic accident mortality in Colombia, in the latest analyzed period, maintains a direct relationship with the progressive and major motorization indexes of the country. When the mortality rates are adjusted, it can be observed that the mortality in Colombia is still higher than that of Spain and the USA. It is very alarming to see that motorcycles in Colombia have become a third part of the motorized park/scrapyard in the year 2000 to constitute more than half in 2014⁽¹⁷⁾. That would explain the increased mortality involving

motorcycle and bicycle users, at 38.9 % and 133.3 %, respectively. In the USA an important mortality increase also took place (40%) among motorcycle users, whereas, in Spain the evolution was positive for all the types of users; on the other hand in Colombia a reduction of the mortality was observed among the pedestrians (-44.8 %) between the years 2000 and 2014.

The results of this study demonstrate evidence that is necessary and urgent to adopt measurements, in Colombia, that is rapidly effective for reverting the final negative tendencies of traffic accident mortality. According to our information, it is clear that the priority must be to reduce the traffic accidents among the young men who are bicycle and motorcycle users. For this reason strategies must be adopted that allow for improvement in designing routes and to offer road education instruction. Also to implement the civil culture and it can be very useful to bear in mind and to adapt to the local reality based on experiences from successful countries such as Spain^(13,18,19).

The fortitude of this study emphasizes the comparable approach of data analysis and rigor applied in the utilization of standardized methods. For the potential limitations, it is necessary to point out the difficulty for studying more disintegrated age groups (7.20) and the limited number of investigative studies in road safety existing in Colombia, that might have contributed new information to study the analysis of the TA mortality more extensively^(12,21,22). Likewise, the fact of being a cross-sectional study prevents establishing causal associations between mortality and its possible determinants.

In conclusion, a less favorable evolution of the mortality is observed for traffic accidents in Colombia than in Spain and the USA, since it presents higher mortality rates in all the age groups and in every period. The initially positive evolution stagnated in the years 2010-2014, fundamentally at the cost of an increase of the mortality in Colombian men aged from

15 to 44 years. The motorcyclists and the cyclists are the most compromised public route users. Therefore, it is necessary to recognize traffic accidents as being one of the principal public health problems posed in Colombia and to adapt this reality to measurements that have been successful in other countries.

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