www.cepal.org/transporte

Issue No. 311 - Number 7 / 2012

BULLETIN FAL

FACILITATION OF TRANSPORT AND TRADE IN LATIN AMERICA AND THE CARIBBEAN

Road safety and public health: the cost of treating and rehabilitating the injured in Chile, Colombia and Peru

This issue of the *FAL Bulletin* examines the implications of road safety for the health-care system. It focuses on the economic cost of treating and rehabilitating road traffic injury victims and, for the sake of better public policy, proposes policy changes aimed at improving data collection as well as coordination among government agencies.

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Introduction

According to the World Health Organization, road traffic injuries are a major public health challenge because of the number of human lives they claim every day and the vast numbers of people who are left disabled or suffer from other after-effects. Road traffic injuries are the leading cause of death among young people aged 15 to 29. Worldwide, pedestrians, bicyclists and drivers and passengers of two-wheel motor vehicles account for approximately 46% of road traffic injury deaths; they have been referred to as vulnerable users of public roads.

Both of these patterns are especially serious in low-income and middle-income countries like those of Latin America and the Caribbean. As the study shows, such countries also devote considerable resources to the treatment and rehabilitation of people injured in road traffic accidents. A large part of this care is covered by the State through public health services, with the resulting social costs for the whole of society. There is, therefore, a pressing need to redouble efforts at the national and regional level to implement effective public policies with integrated solutions for mobility in cities and in rural areas as an essential component of sustainable transport.

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International experience shows that countries taking comprehensive, long-term action with interventions in the spheres of health, education, legislation, infrastructure, equipment and oversight are those that have achieved substantial, lasting decreases.

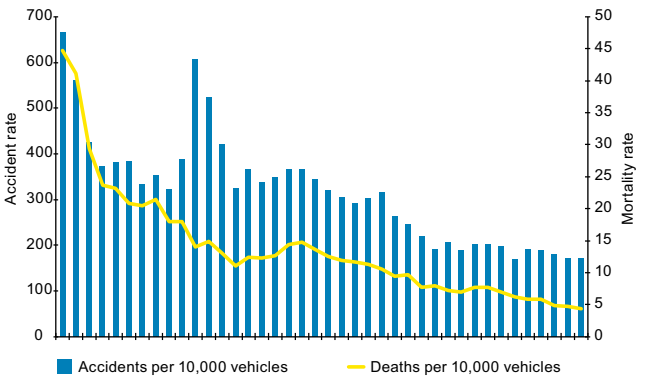
Several recent ECLAC reports have addressed this issue from different viewpoints, seeking an integrated, multidisciplinary approach encompassing public transport policy, infrastructure project design, effective measures for reducing the accident rate and road safety campaigns, to name just a few of the dimensions examined. This issue of the FAL Bulletin looks at the matter from a public health viewpoint, providing empirical evidence of the serious nature of the problem and its real impacts for society and, particularly, for public health in the countries of Latin America. The three case studies —Chile (at the national level), Colombia (Caldas and Medellín) and Peru (Lima)— are different and cover different population groups and periods of time. As a result, the accident rates and costs examined do not lend themselves to direct comparison. But there are similarities in the findings, so the good practices that emerge from them could potentially be replicated across the region.

I. Road traffic injuries in Chile, Colombia and Peru

In Chile, 1,573 people died from road traffic accidents in 2011 and more than 54,000 people sustained injuries, 12.4% of them severe. According to figures from Chile's National Traffic Safety Commission, the death and injury rate has fallen sharply, to 9.2 fatalities per 100,000 population in 2011. Despite this, major regulatory changes are under way (particularly concerning the zero-tolerance standard for driving under the influence of alcohol) in an effort to further reduce the fatality and injury rates in Chile shown in the figure below.

In 2000–2009, the highest number of deaths from road traffic injuries was in regions with the largest population and, therefore, the largest number of motor vehicles. The Santiago Metropolitan Region accounted for 32.7% of fatalities nationwide, followed by the Bío Bío Region with 14.4%, Maule Region with 9.5% and Valparaíso Region with 8.1% of the national total. Most accidents are on weekends, peaking on Friday and Saturday. Accident statistics show the highest rates during rush hour, especially between 7 a.m. and 8 a.m., followed by 6 p.m. to 8 p.m. Chile's National Traffic Safety Commission (CONASET) estimates that in 2010 the social cost of road traffic accidents amounted to US$ 355 million, most of which corresponds to the human capital cost of fatalities, treating and rehabilitating the injured, administrative costs, lost workforce productivity, loss of infrastructure stock and damage to the legitimacy and credibility of the State, which is responsible for the governance of society.

Figure 1
CHILE: TRAFFIC ACCIDENT AND TRAFFIC-ACCIDENT MORTALITY RATES, 1972-2011



Source: National Traffic Safety Commission (CONASET), Government of Chile, 2012.

Colombia's fatality rate is 11.7 per 100,000 population. According to the country's Road Prevention Fund, the road traffic death rate held steady between 2003 and 2010 at an average 5,490 fatalities per year. They are concentrated above all in the most heavily populated areas, especially in the Bogotá district, at 24%, followed by Antioquia with 15%, Valle del Cauca with 13%, and Cundinamarca and Santander, at 8% and 5% respectively. Together, these areas account for more than 65% of the fatalities. Most accidents happen on weekends, especially in urban areas and on highways, and they peak in the early morning hours. Road traffic injuries are the second leading cause of non-natural deaths in Colombia, accounting for 22% in 2009 according to data from the country's Institute of Legal Medicine and Forensic Sciences.

The National Police Force of Peru reports that every 24 hours 10 Peruvians die from road traffic injuries; the fatality rate is 12 per 100,000 population. Throughout Peru, some 3,243 people died in 2009 and 48,395 sustained road traffic injuries. The more than 120,000 people disabled by road traffic injuries over the past four years are the leading cause of Peru's disease burden and account for the largest number of years of healthy life lost (Wong and others, 2010).

1. Recklessness, speed and alcohol: main causes of road accidents

Road traffic accidents are always multicausal and therefore involve an array of factors, but information gathered by the police authorities that investigate them shows that the most common underlying causes in Latin America are driver or pedestrian recklessness, loss of control of the vehicle, inappropriate speed and driving under the influence of alcohol.

In the specific case of Chile, and based on information from the Carabiniers of Chile for 2011, the main cause of road accidents resulting in death is pedestrian recklessness (22.9%), followed by reckless driving (18.4%), loss of control of the vehicle (15.8%), imprudent speed (12.5%), drinking and driving (13%, including driving under the influence of alcohol and driving while intoxicated), failure to heed traffic signs (5% of accidents) and accidents caused by drunk pedestrians (4.3%) (see table 1).

Table 1
CHILE: MAIN UNDERLYING CAUSE OF ROAD TRAFFIC ACCIDENTS, 2011

Cause	Number of accidents	Fatalities	Percentage	Injuries			Total injuries
				Severe	Moderate	Minor	
Pedestrian recklessness	3 173	361	22.9	783	350	1 894	3 027
Reckless driving	28 426	290	18.4	1 968	1 429	17 031	20 428
Loss of control of vehicle	4 469	249	15.8	767	591	4 329	5 687
Imprudent speed	2 085	213	13.5	371	211	1 604	2 186
Alcohol in driver	5 046	205	13.0	849	563	3 830	5 242
Failure to obey signs	6 021	78	5.0	506	355	5 721	6 582
Alcohol in pedestrian	478	67	4.3	128	58	251	437
Undetermined	5 869	32	2.0	590	361	3 174	4 125
Other	4 676	32	2.0	396	262	2 697	3 355
Mechanical failure	1 082	22	1.4	167	114	1 202	1 483
Drugs and/or driver fatigue	575	19	1.2	123	96	640	859
Poor road conditions	545	3	0.2	40	38	352	430
Passenger recklessness	373	2	0.1	33	23	300	356
Alcohol in vehicle passenger	16	0	0.0	3	3	9	15
Grand total	62 834	1 573	100.0	6 724	4 454	43 034	54 212

Source: National Traffic Safety Commission (CONASET), Government of Chile, 2012.

In Colombia, as much as 90% of accidents are caused by human factors, especially driver recklessness, failure to obey traffic signs, loss of control of the vehicle and alcohol in the driver. Excessive speed was the leading reported cause of accidents with fatalities on city streets and ranked second among the causes of accidents with fatalities on rural roads (Cardona-Arbeláez and others, 2010).

In Peru the pattern is the same. Official police reports show that the main causes of road accidents are excessive speed and driver recklessness or pedestrian negligence.

2. Young single men, the most at-risk group

In Chile between 2001 and 2009, more than 80% of road traffic-related deaths were men; the largest number of fatalities (33% of the national total) were men aged 30 to 44. More than half (57.51%) of the deaths during the period reviewed were single people, chiefly men aged 15 to 29 (35.6% of the cases) as can be seen in table 2. Among women, the highest rate was for that same age and marital status group, highlighting the need for preventive action targeting young people.

As for road traffic injuries, between 2001 and 2009 hospital discharges (public and private hospitals combined) in Chile due to road traffic injuries totalled 109,498. In other words, more than 100,000 people sustained road traffic injuries so severe that they required hospitalization. Of the injured, 72.4% were men and 27.6% were women, confirming observations that the groups most at risk are men aged 15 to 29 and 30 to 44. Among women, the most at-risk group is the 15-to-29 age bracket, with a slight increase for the group aged 70 and over that could be due to their accounting for an increasing proportion of pedestrians struck by motor vehicles.

The pattern is the same in Colombia, where some 67% of all traffic injuries are men and the ratio of men to women sustaining road traffic injuries is, according to the National Road Safety Plan, a constant 2:1. In 2010, male pedestrians accounted for 72% of the fatalities. A study of road traffic accidents in Caldas between 2007 and 2008 revealed similar findings and estimated than more than 80% of the victims were males and more than 50% were under the age of 35 (Posada and others, 2000). The pattern is similar for injuries: 64% were men, and the age groups with the highest proportion of injuries were men aged 35 to 44 and women aged 15 to 24. As for years of schooling, 45% only had a primary school education, another 45% had attended secondary school and just 2.9% had a post-secondary education. Another 4.3% of the victims had no schooling. As for marital status, the largest portion of the injured were single (37.4%), followed closely by married individuals, at 31.7% (Cardona-Arbeláez and others, 2010).

Table 2
CHILE: ROAD TRAFFIC FATALITIES BY SEX, AGE GROUP AND MARITAL STATUS, 2001-2009

Age group	Men				Women			
	Single	Married	Widowed	Not known	Single	Married	Widowed	Not known
0-4	2.2	0.0	0.0	0.0	7.5	0.0	0.0	0.0
5-14	5.6	0.0	0.0	0.0	13.8	0.0	0.0	0.0
15-29	35.6	5.7	0.6	9.1	34.7	6.9	5.7	0.0
30-44	24.5	32.4	15.2	45.5	13.6	27.4	17.9	33.3
45-59	16.8	33.6	20.2	36.4	12.1	26.5	17.9	50.0
60-69	8.9	15.1	18.0	9.1	7.6	15.4	25.2	16.7
70+	6.4	13.2	46.1	0.0	10.8	23.8	33.3	0.0
Total	100	100	100	100	100	100	100	100

Source: Siniestros de tránsito y su impacto en el sistema de salud chileno, Pérez Salas and others, 2012.

In Peru the picture is the same. Men account for a higher proportion of the injured in road traffic accidents, at a ratio of 2:1 over women. Between 1990 and 2000, 67% of the injured were men, chiefly young adult men. The III National Survey of Drug Use in the General Population of Peru, conducted in 2006, gathered data on road traffic accidents that corroborated these figures. Of the population that had been involved in a road traffic accident, 59.7% were males with an average age of 34. As for years of schooling, individuals with the lowest and the highest levels of education reported the highest proportion (3.6%). The relationship between education level and road traffic accidents is statistically significant (Wong, 2010).

3. Pedestrians, the most vulnerable users

Statistics on fatalities by type of participant show that pedestrians are the most at-risk group. In each and every one of the countries and cities examined, pedestrians accounted for the highest proportion of victims; this is in line with worldwide estimates.

In Chile, as table 3 shows, 44.4% of the fatalities are pedestrians, primarily aged 46 to 63, followed by occupants of motor vehicles (automobiles and light utility vehicles) at 42.67% and bicyclists at 3.27% of total fatalities.

Table 3
CHILE: ROAD TRAFFIC DEATHS BY TYPE OF PARTICIPANT, 2001-2009

Participant	Fatalities	Percentage	Cumulative
Pedestrian	8 459	44.45	44.4
Individual injured by unspecified motor vehicle	6 367	33.45	77.9
Occupant of automobile	1 121	5.89	83.8
Occupant of light utility vehicle	633	3.33	87.1
Bicyclist	623	3.27	90.4
Individual injured in accident with unspecified vehicle	426	2.24	92.6
Occupant of heavy transport vehicle	413	2.17	94.8
Motorcyclist injured in road traffic accident	408	2.14	96.9
Occupant of a bus	309	1.62	98.6
Other road traffic accidents	273	1.43	100.0
Total road traffic accidents	19 032	100.0	...

Source: Siniestros de tránsito y su impacto en el sistema de salud chileno, Pérez Salas and others, 2012.

In Colombia, pedestrians and motorcyclists are the most vulnerable participants in road traffic. Between them they make up 70% of the fatalities. In some cities motorcycles account for nearly two thirds of the local motor vehicle population; nationwide there are more than 2.7 million of them. In 2010, 2,151 motorcyclists died in road traffic accidents (39.4% of the fatalities). Pedestrians ranked second, at 1,692 victims in 2010 (31% of total fatalities), 41% of whom were adults over the age of 59. The fact that the main cause of death among pedestrians is, precisely, being struck by a motorcycle, highlights the need for action targeting this segment.

The pattern in the town of Caldas is the same as it is worldwide: pedestrians are the road users most at risk of dying. They account for 33.1% of the fatalities, followed by passengers (30.9%) and, in third place, by motorcyclists (20.9%). The figure for bicyclists is 8.6%, for drivers, 4.3% and others, 2.2%.

In Lima, Peru, 71.1% of the accidents are collisions between vehicles, followed by runovers (20.44%), turnovers (2.48%), vehicle occupant ejections (2.04%) and others (3.33%). Between June 2000 and May 2001, 58% of the road traffic accidents in Lima were runovers; pedestrians accounted for 78% of total fatalities and 63% of the severe injuries (Bambarem Alatrista, 2004).

Table 4
COLOMBIA: ROAD TRAFFIC DEATHS, 2005-2010

Participant	Fatalities 2005	Fatalities 2010	Percentage 2010
Motorcyclist	1 308	2 151	39.4
Pedestrian	1 881	1 692	31.0
Private transport	521	502	9.2
Bicyclist	458	318	5.8
Public transport	388	229	4.2
Freight transport	135	120	2.2
Other causes		446	8.2
Total road traffic accidents	4 691	5 458	100.0

Source: Colombia National Road Safety Plan 2011 - 2016, Ministry of Transport of Colombia, 2012.

II. Road traffic injuries and their impact on the health-care system

International experience has shown that road traffic injury victims consume the most health care costs within the first 24 hours after the accident. A large amount of economic resources are devoted to transport, emergency care, transfusions, intensive therapy, surgery, orthopedics, prostheses, neurology, intravenous solutions and other medicines, not to mention the demands that traffic accidents place on human and technological resources that cannot, as a result, be used for other emergencies or scheduled surgeries.

1. Trauma: main cause of fatalities and injuries

International evidence shows that most road traffic accident injuries are to the upper and lower parts of the body and that the severity of the injury is directly related to the part or parts of the body affected (García and others, 2010). Most road traffic accident fatalities are from brain or chest injuries, which are precisely those that are usually prevented by seat-belts and child restraints.

In Chile, too, traumatic injuries are the main cause of road accident-related deaths. Polytrauma accounts for 46.7% and intracranial injuries for 28.3%; together, these two types of injury explain 75% of road traffic injury deaths in Chile (see table 5). Other injuries involving multiple body regions include intrathoracic injuries, chest trauma, spinal cord injuries, diffuse brain injuries, abdominal trauma and cervical spinal cord injuries.

The largest percentage of injuries are unspecified intracranial injuries (17.5%), multiple unspecified superficial injuries (11.2%), multiple unspecified injuries (3.4%) and fractures of other parts of the leg (ankle, bimalleolar, trimalleolar) (2.7%), followed by tibia shaft fracture (2.4%) and unspecified leg fracture (2.1%), as table 6 shows.

Table 5
CHILE: MAIN INJURIES CAUSING ROAD TRAFFIC-RELATED DEATHS, 2001-2009

ICD-10	Type of injury	Deaths	Percentage	Cumulative
T07X	Unspecified multiple injuries	6 658	35.0	35.0
S069	Unspecified Intracranial injuries	5 394	28.3	63.3
T068	Other specified injuries involving multiple body regions	2 223	11.7	75.0
T065	Injuries of intrathoracic organs with intra-abdominal and pelvic organs	583	3.1	78.1
S299	Unspecified injury of thorax	519	2.7	80.8
T093	Injury of spinal cord, level unspecified	248	1.3	82.1
S068	Other intracranial injuries	231	1.2	83.3
S062	Diffuse brain injury	203	1.1	84.4
S399	Unspecified injury of abdomen, lower back and pelvis	184	1.0	85.3
S141	Other and unspecified superficial injuries of cervical spinal cord	171	0.9	86.2
	Other causes	2 618	13.8	100.0
	Total	19 032	100.0	

Source: Siniestros de tránsito y su impacto en el sistema de salud chileno, Pérez Salas and others, 2012.

In Colombia, unspecified polytrauma accounts for the largest percentage, at 53.9% of the records, followed by encephalocranial trauma (36%), chest injury (3.4%), abdominal injury (2.3%), neck injury (1.6%), injury to limbs (1.5%), pelvic injuries (0.9%) and paragenital injury (0.1%) (Pérez, 2007). In Caldas, most injuries (87% of the cases) are multiple.

In another major city in Colombia (Medellín), information gathered at the Medellín General Hospital during 2005 shows that of the 428 patients admitted for road traffic injuries, 65.4% had sustained injuries to a lower limb and 21.3% had sustained injuries to an upper limb, as the following table shows.

Table 6
CHILE: LEADING ROAD TRAFFIC-RELATED INJURIES CAUSING HOSPITAL DISCHARGES, 2001-2009

ICD-10	Injury	Patients	Percentage	Cumulative
S069	Unspecified Intracranial injuries	19 160	17.5	17.5
T009	Multiple unspecified superficial injuries	12 258	11.2	28.7
T07X	Unspecified multiple injuries	3 740	3.4	32.1
S828	Fractures of other parts of leg (ankle, bimalleolar, trimalleolar)	3 000	2.7	34.8
S822	Fracture of shaft of tibia	2 682	2.4	37.3
S829	Fracture of leg, part unspecified	2 274	2.1	39.4
S729	Fracture of femur, part unspecified	2 224	2.0	41.4
S423	Fracture of shaft of humerus	1 812	1.7	43.1
S420	Fracture of clavicle	1 795	1.6	44.7
S009	Superficial injury of head, part unspecified	1 739	1.6	46.3
	Other injuries	58 814	53.7	100.0
	Total	109 498	100.0	...

Source: Siniestros de tránsito y su impacto en el sistema de salud chileno, Pérez Salas and others, 2012.

Table 7
COLOMBIA (CALDAS): LEADING ROAD TRAFFIC-RELATED INJURIES, EMERGENCY SERVICES IN CALDAS, ANTIOQUIA, 2007-2008

ICD-10	Type of injury	Deaths	Percentage	Cumulative
T14.9	Unspecified injuries	61	43.8	43.8
T07	Unspecified multiple injuries	60	43.2	87.0
S09.9	Unspecified head injury	10	7.2	94.2
S37.9	Unspecified pelvic organ injury	4	2.9	97.1
S19.9	Unspecified neck injury	2	1.4	98.6
S29.9	Unspecified chest injury	2	1.4	100.0
	Total	139	100.0	...

Source: Caracterización de accidentes de tránsito y valoración tarifaria de la atención médica en el servicio de urgencias, Caldas-Antioquia 2007-2008, Cardona-Arbeláez, 2010.

Table 8
COLOMBIA (MEDELLÍN): LEADING ROAD TRAFFIC-RELATED INJURIES, MEDELLÍN GENERAL HOSPITAL, 2005

Injury	Number	Percentage
Lower extremity	280	65.4
Upper extremity	91	21.3
Upper and lower extremity	21	4.9
Column	20	4.7
Lower extremity and spine	4	0.9
Chest	4	0.9
Upper extremity and spine	3	0.7
Upper extremity and chest	2	0.5
Lower extremity and chest	2	0.5
Upper and lower extremity and spine	1	0.2
	428	100.0

Source: Lesiones músculo esqueléticas causadas por accidentes de tránsito, Hospital de Medellín, Calle and othersl, 2007

Fractures were the most frequently reported type of injury, at 84.3%. Dislocations and other injuries accounted for 7.6% of the total; other injuries and combinations of injuries were of little statistical value. The most frequently diagnosed and treated injury was tibia shaft fracture (28.7%), followed by other lower limb injuries (14.6%), fracture of ulna and/or radius (11.8%), femur shaft fracture (10%), ankle fracture (8.6%) and tarsal bone fracture (6.9%). The most common upper extremity injury was fracture of ulna and/or radius (11.8% of total injuries), followed by humeral shaft fracture (4.2%) and carpal bone fracture (3.7%). Clavicle fractures accounted for 3% of all body injuries, alone or associated with other musculoskeletal injuries.

In Lima, 88% of cases during the period reviewed involved for external injuries, the most common being contusions (76% of all external injuries), followed by cuts (18%). The second most frequently injured regions were the extremities and pelvis (10% of all cases). Fractures were the most frequent injury, making up 4% of total injuries.

2. A high percentage of hospital beds are devoted to the treatment and rehabilitation of road traffic injury victims

Using information from the hospital discharge database of the Ministry of Health of Chile, it was found that during 2001-2009 a total of 109,498 patients were hospitalized in the health-care system for road traffic injuries. The universe of injuries was divided into patients receiving surgery and those who did not. Then, for each type of road traffic injury, the average number of days of hospitalization for each type of care was obtained; this figure is also in the discharge database. This made it possible to determine the average number of bed days for each injury, which was, for the period reviewed, 3,240 hospital bed days for road traffic-related traumatic injuries, fractures and other injuries. That is 8.5% of the total number of available beds nationwide, including at private facilities, and it highlights the economic cost and social impact for the rest of society because those beds could have been used for critically ill patients. An examination of the type of insurance held by injury victims showed that only 9% were covered by private insurance and revealed two important facts: much of the cost of treating and rehabilitating road traffic injury victims is covered by the Chilean State, and most of the care is provided by public health services.

The injuries with the greatest hospitalization demand were unspecified intracranial injuries (13% of the total), followed by multiple unspecified injuries (7%), multiple unspecified superficial injuries (4.1%), fracture of femur, part unspecified (3.9%) and fracture of leg unspecified (3.6%). Table 9 shows the 15 main injuries (and their ICD-10 code), which, together, account for 53.4% of the total number of beds used by road traffic injury victims.

Table 9
CHILE: AVERAGE HOSPITAL STAY FOR PATIENTS HOSPITALIZED FOR ROAD TRAFFIC INJURIES, BY TYPE OF INJURY, 2001-2009

Type of injury / ICD code	Patients with surgery	Patients without surgery	Patients without information	Average stay with surgery (days)	Average stay without surgery (days)	Average stay, no information (days)	Percentage of all road traffic injuries
Unspecified intracranial injuries (SA069)	1 678	16 994	156	18.5	4.4	7.4	13.0
Unspecified multiple injuries (T07X)	1 548	2 070	34	25.6	8.7	9.3	7.0
Multiple unspecified superficial injuries (T009)	611	11 472	40	7.8	2.5	2.9	4.1
Fracture of femur, part unspecified (S729)	1 540	644	11	16.6	10.1	8.2	3.9
Fracture of leg, part unspecified (S829)	1 601	626	14	14.9	9.0	7.8	3.6
Fracture of shaft of tibia (S822)	1 792	843	18	11.6	7.7	10.1	3.3
Fractures of other parts of leg (S828)	2 119	833	20	9.6	5.3	11.3	3.0
Fracture of lower limb, level unspecified (T12X)	988	652	16	16.0	8.5	8.4	2.6
Fracture of neck of femur	953	496	5	17.1	9.8	16.4	2.6
Sequelae of intracranial injury (S720)	2	315	0	16.5	67.3	0	2.6
Fracture of other and unspecified parts of lumbar spine and pelvis (S382) [favor de verificar código]	417	924	8	22.8	8.4	23.5	2.1
Fracture of shaft of humerus (S423)	1 040	753	7	9.5	4.3	6.0	1.6
Fracture of upper end of tibia (S821)	866	243	14	11.4	7.3	21.7	1.4
Multiple fractures, unspecified (T029)	332	273	15	20.5	12.2	31.5	1.3
Other intracranial injuries (S068)	130	621	2	27.3	10.8	9.5	1.2
Other injuries	23 232	30 869	1 662	...	...	...	46.7
Total	38 849	68 628	2 022	...	...	...	100.0

Source: Siniestros de tránsito y su impacto en el sistema de salud chileno, Pérez Salas and others, 2012.
Note: With surgery: patients requiring surgery as a result of injuries caused by road traffic accidents.
With surgery: patients not requiring surgery.
No information: patients for whom no data on surgery are available.

In Colombia, road traffic injury victims occupied hospital beds for an average of one to two weeks. In Medellín, the average hospital stay was eight days and the maximum was 87 days. In Caldas, the average was 27.2 days, the median was 20 days and the range was from 6 days to 180 days. In both cases, rehabilitation of victims required a significant number of bed days. This is deserving of attention not only because of the cost but also because it sometimes means that needier patients requiring urgent specialized care do not receive it.

In Lima, road traffic injury victims used an average of 12 bed days. The maximum was 288 days and the minimum was one day.

3. Estimated economic cost of road traffic injury victim treatment and recovery

In keeping with World Health Organization guidelines, the economic cost of treatment for and recovery from road traffic injuries was estimated by adding the cost of emergency care, surgeries, hospitalization and recovery, including the cost of medical and auxiliary staff.

In Chile, information on average number of days of hospitalization by type of injury and treatment received (table 9) was used to estimate the average monetary cost for each type of injury and treatment, taking into account the degree of severity (need for surgery), average hospital stay in days and health care staff fees. Chile spends an average of more than US$ 21 million a year on treatment and rehabilitation of road traffic injury victims, mainly to cover the cost of surgery and medical fees. For severe injuries, the average cost of care is estimated at US$ 3,111 (Bambarem Alatrista, 2004).

In Colombia, the most significant item of expense for medical care provided to road traffic injury victims at the department of emergency medicine at the HSVP hospital in Caldas, Antioquia, was non-surgical therapeutic procedures, followed by medicines under the Mandatory Health Plan and then by diagnostic aids. The lowest costs were for hospitalization. The findings were similar in Medellín, where the average cost of care was US$ 2,000 and the maximum was US$ 6,700 per person.

In Peru, the direct cost of road traffic injuries at Cayetano Heredia National Hospital between June 2000 and May 2001 was nearly US$ 500,000 for emergency care, laboratory tests and imaging studies, medical and surgical procedures, medicines and hospital stays, plus the cost of rehabilitation for patients needing it. The cost breakdown shows that the largest item tended to be the cost of hospitalization (43%) followed by medical and surgical procedures (18%), laboratory tests and imaging studies (16%), emergency care (11%), medical fees (5%), rehabilitation (4%) and medicines (3%). For patients who only received emergency care, 40% of the cost was for laboratory tests and imaging. The average cost of a severe injury was US$ 1,964 (Bambarem Alatrista, 2004).

III. Key findings

The World Health Organization has called road traffic injuries a growing epidemic. In 2002, they were already the second cause of morbidity worldwide in the 15-to-29 age group. It is estimated that by 2020 they will be the third cause of death worldwide, ranking higher than, for example, cerebrovascular disorders and obstructive pulmonary diseases (WHO, 2009). Among young persons, road traffic injuries are already the leading cause of death.

In Latin America, pedestrians are the most at risk of injury or death, followed by other vulnerable road users such as bicyclists and motorcyclists. Nevertheless, Chile stands out because of the low percentages for bicyclists (3.27%) and motorcyclists (2.14%), which are usually regarded as the most dangerous modes of transport. This could be because the penetration of motorcycles is not as high as in other cities in the region, or it could be that accidents are underreported because of coding problems while taking down data. Perhaps these incidents are being classed as runovers or as unspecified, because the percentage for unclassified vehicles is too high (33%). The same is true for improper coding under ICD-10,[1] where there is a tendency to use generic codes without indicating the specific type of injury. This could be because of lack of information or not having enough time to look up the most appropriate code, or because the studies examined did not include "divorced" as a category under marital status. Obviously, there are still weaknesses in the taking and coding of data on road traffic accidents. It is therefore necessary to continue to enhance intra-and interinstitutional coordination and foster the electronic exchange of homogenous, standardized data in order to better understand the causes and consequences of road accidents. Otherwise, the statistics could be masking at-risk groups that have not been appropriately targeted by public policy and are therefore not receiving the necessary attention.

[1] International Classification of Diseases, 10th revision.

Medical services for treating and rehabilitating road traffic injury victims cost a good deal in terms of inputs, hospital facilities and health-care professionals, mainly in the public sector. On average, 8.5% of Chile's hospital beds (public and private sector alike) are used by road traffic injury victims. The same is true of the cities of Caldas and Medellín in Colombia and Lima in Peru, where the average hospital stay for recovering from an injury is two weeks. This picture is especially worrying in areas where the ratio of hospital beds to population is too low, or during critical periods from a national health viewpoint. For example, during the winter season hospital beds need to be converted for treating bronchopulmonary diseases. Even though the figures could be underestimating the real dimensions of the problem because of averaging and of underreporting of road traffic injury discharges, the study spotlights the situation and suggests that some of these patients could be referred to other, less complex hospitals or to home hospitalization arrangements.

Another finding is that public health services are the main provider of care. The cost of care often exceeds the maximum benefits paid by mandatory traffic accident insurance in both countries, and the State ends up covering the overage. The lack of information on causes, state of intoxication or other data identifying the patient or the party causing the accident makes it hard to follow up on efforts to collect from insurance companies or from the causing party and further adds to the excess costs for public health systems.

The opportunity cost to society should also be borne in mind. Emergency services and surgery for road traffic injuries keep operating rooms from being used for elective surgery and help lengthen the waiting list of patients in need of surgery.

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