

# What Is the Social Cost of Injured People in Traffic Collisions? An Assessment for Catalonia

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**Background:** Traffic collisions are an important public health problem worldwide, in terms of mortality, morbidity, and economic burden. The goal of this study is to estimate the social cost of injured people in traffic collisions in Catalonia in the year 2007.

**Methods:** We performed a cost-of-illness analysis, under the perspective of the healthcare system, the public sector, and the society, using a 1-year time horizon. In Catalonia, during 2007, there were a total of 26,063 collisions with victims, which translates into 34,565 non-mortal victims and 521 deaths. As direct costs, all healthcare costs (primary care, acute hospital care, emergency care, ambulances and transport, long-term care, and specialized care); costs of adaptation to disability, disability benefits, material costs, and administrative costs; and costs of police, fire-fighters, and road assistance have been included. As indirect costs, productivity losses as a result of hospital and long-term institutionalization as well as productivity losses from work sick leave and productivity losses of carers have been taken into account.

**Results:** From the perspective of the healthcare system, the cost of the injured people in traffic collisions was 31,803,024.03€ in 2007; from the perspective of the public sector, it was 134,047,059.27€ (up to 1,463,645,407.13€ in the sensitivity analysis) and 144,043,238.88€ (up to 1,558,926,995.12€ in the sensitivity analysis) from the perspective of the society. The cost per injured person ranged from 3,855.38€ from the perspective of the healthcare system to 17,461.90€ from the perspective of the society (up to 188,983.76€ in the sensitivity analysis).

**Conclusions:** The importance of the costs of injured people in traffic collisions is an argument more—besides the epidemiologic and social impact—to start off preventive policies.

**Key Words:** Cost of illness, Injuries, Traffic collision.

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Traffic collisions are an important public health problem around the world, in terms of mortality and morbidity.<sup>1,2</sup> According to the World Health Organization, more than a million people die in the world because of traffic collisions yearly and between 20 and 50 million people get injured. In Spain, injuries in traffic collisions are the first cause of death

for the population aged up to 39 years, the third for the population aged 40 years to 59 years, and the fifth for that of 60 years to 69 years.<sup>3</sup> Moreover, they are the first cause of potential years of life lost among men and the second among women.<sup>4,5</sup>

Catalonia is one of the 17 Autonomous Communities of Spain, with a population of 7,364,078 inhabitants (as in 2007) and an extension of 31,895 km<sup>2</sup>, situated in the northeast of Spain. In Catalonia, there were 26,063 traffic collisions with victims registered during 2007, which translates into 34,565 non-mortal victims and 521 deaths.<sup>6</sup> Although the number of deaths has diminished during the past 10 years (they were 950 deaths in year 1998), the number of injured people has kept stable.

This issue is in the policy agenda of local, national, and supranational administrations. To improve road safety, the White Paper on European Transport Policy established the goal to reduce traffic collisions by 50% between 2001 and 2010.<sup>7</sup> The Road Safety Action Programme describes specific measures related with the behavior of users, safety of vehicles, and road infrastructures to achieve this goal.<sup>8</sup> European governments, among them that of Catalonia, have started special measures with the same purpose.<sup>9</sup>

A part from their human cost, traffic collisions involve a strong economic cost in terms of lost productivity as well as for the public sector in terms of welfare benefits and specific policies and, in particular, for the healthcare sector including acute and rehabilitation care. The existing estimations, including deaths and injured people, show that the cost of traffic collisions in several Spanish cities and regions were between 147.24€ per capita in Canary Islands in 1997 and 576.47€ per capita in Galicia in 2003<sup>10–12</sup>; estimations for Spain were up to 204.93€ per capita in 2004,<sup>13,14</sup> and up to tens of billions of Euros in the European Union.<sup>15</sup>

The aim of this study is to estimate the social cost of injured people in traffic collisions in Catalonia in the year 2007, using the cost of illness method.

## MATERIALS AND METHODS

A cost-of-illness analysis was performed using the prevalence approach, valuing all costs occurred associated with traffic collisions during 2007. For every cost concept, a different number of cases have been used, as well as different data sources of costs, as explained below.

### Prevalence

In Catalonia, during 2007, there were a total of 26,063 collisions with victims, which translates into 34,565 non-

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mortal victims and 521 deaths.<sup>6</sup> The number of acute hospital admissions has been calculated using the external cause code and the type of funding of the admission reported on the registry of minimum basic data of acute hospitals (CMBD-HA, according to the Catalan abbreviation), accounting for 8,249 admissions. According to their severity, 86.5% were slightly injured people and 13.5% were severely injured people.<sup>16</sup>

### Perspective of Analysis

We used the perspective of analysis of the healthcare system, the public sector, and the society. Under the perspective of the healthcare system only direct healthcare costs have been included: primary care, acute hospital care, emergency care, ambulances and transport, long-term care, and specialized care. Under the perspective of the public sector, disability benefits; police, fire fighters, and road assistance costs; and subsidies for temporary and permanent work sick leave have been added to the healthcare costs. Finally, from the perspective of the society, private direct costs associated with

adaptation to disability, material costs, administrative costs, and productivity losses of injured people and their carers have been added.

### Primary Care

It has been assumed that all injured people who have not been admitted to hospital have visited once a primary healthcare professional and applied the corresponding reimbursement tariff to this number (Table 1).<sup>17</sup>

### Acute Hospital Care

To the total number of acute hospital admissions as a result of traffic collisions, the reimbursement tariff by hospital complexity was applied (Table 1).<sup>17</sup>

### Emergency Care

It has been assumed that all acute hospital admissions had a previous visit in the emergency department. Thus, the reimbursement tariff by hospital complexity was applied (Table 1).<sup>17</sup>

**TABLE 1.** Units, Prices, and Information Sources Used in the Analysis, Catalonia, 2007

Concept	No. Units	Price	Reference
<b>Direct costs</b>			
Primary care	26,316 injured people not admitted to hospital	1 visit = 49.04€	6, 17
Acute hospital care	8,249 discharges	1 discharge = 2,017.90€	17
Emergency care	8,249 visits	1 emergency = 82.04€	17
Ambulances and transport	8,249 transports	Ambulance transport = 210€; helicopter transport = 2301€	Medical Emergency Service, personal communication
Long-term care	3,573 d of stay	1 stay = 51.45€	18
Rehabilitation care	470 severely injured people	1 h physiotherapy/d = 30.07€; 1 h nursing/mo = 30.07€	19
	7,779 slightly injured people	1 h nursing/mo = 30.07€	19
Adaptation to disability	470 severely injured people	Home adaptation = 801.80€; technical aids and orthopedic material = 520.80€-1,382.09€; vehicle adaptation = 2,896.78€-4,643.97€	19
Disability benefits	470 severely injured people	Disability benefits = 9,077.82€-13,029.10€; deductions on taxable income = 1,393.45€-2,264.36€	19
Material costs	26,063 accidents with victims	600€ and 900€ (1% at 10,500€)	6, 21
Administrative costs	470 severely injured people	44.26€	6, 22
	7,779 slightly injured people		
Police	470 severely injured people	608.00€	14
	7,779 slightly injured people	306.31€	14
Fire-fighters	470 severely injured people	260.90€	14
	7,779 slightly injured people	123.14€	14
Road assistance	26,063 accidents with victims	159.66€	6
<b>Indirect costs</b>			
Temporary sick leave	7,961 injured people ≤20 d of stay; 288 injured people >20 d of stay	2,612.40€/mo	24, 25, 26
Institutionalization	84,461 d	2,612.40€/mo	24, 25, 26
Permanent sick leave	8,249 injured people	2,612.40€/mo	24, 26, 27
Work sick leave	8,249 injured people	2,612.40€/mo	24, 26, 27
Work leave of carers	470 severely injured people	1 h/d = 8.13€, 1.5-6.5 h/d	19

d, day; mo, month.

## Ambulances and Transport

It has been assumed that acute hospital admissions corresponding to slightly injured people got to the hospital by ambulance, whereas those corresponding to severely injured got by helicopter. To these numbers, we applied the corresponding reimbursement tariff (Medical Emergency Service, personal communication) (Table 1).

## Long-Term Care

We obtained the number of episodes of long-term care by typology of service from the registry of minimum basic data of long-term centers (CMBD-SS, according to the Catalan abbreviation). To the total days of stay by typology of service, the corresponding unitary reimbursement tariff was applied (Table 1).<sup>18</sup>

## Specialized Care

We assumed that the 86.5% of slightly injured people would have a degree 1 of disability and they would only need an hour of nursing care per month,<sup>16</sup> with its corresponding reimbursement tariff updated to 2007.<sup>19,20</sup> For the ones severely injured (13.5%), we assumed that they had a degree 2 and 3 of disability and they would need an hour of physiotherapy per day and an hour of nursing care per month, with its corresponding reimbursement tariff updated to 2007 (Table 1).<sup>19,20</sup>

## Adaptation to Disability

To calculate the costs of adapting to disability, we took into account the annualized investment necessary to adapt a home to a physical disability, technical aids and orthopedic material, and vehicle adaptation, and applied to those 13.5% severely injured, with its corresponding costs updated to 2007 (Table 1).<sup>19,20</sup>

For technical aids and orthopedic material, a minimum value in the base case has been used (corresponding to orthopedic material and less technical help) and a maximum value (orthopedic material and more technical help) in the sensitivity analysis, with its corresponding costs updated to 2007.<sup>19,20</sup> Regarding vehicle adaptation, a minimum value was used in the base case (less adaptations), and a maximum value (more adaptations) was used in the sensitivity analysis, with its corresponding cost updated to 2007 (Table 1).<sup>19,20</sup>

## Disability Benefits

In Catalonia, there are several entities that provide disability benefits. Money grants are conceded for specialist treatments (psychomotricity, language rehabilitation, and physiotherapy), personal assistance, social support and home care, day care in specialized centers, mobility (management of driving license and vehicle adaptation), specific services (early attention and rehabilitation), technical aids, family respite services, accessibility, tax exemptions, and discounts in transportation. The mean money grant was used in the base case, using the mean maximum value in the sensitivity analysis, updated to 2007, for those severely injured (13.5%; Table 1).<sup>16,19,20</sup> Finally, people with disabilities have deductions on taxable income. The mean minimum deduction was used in the base case, and the mean maximum value was used

in the sensitivity analysis, updated to 2007, for those severely injured (13.5%; Table 1).<sup>16,19,20</sup>

## Material Costs

According to insurance data, 25% of the traffic collisions have material costs. Of these, and regardless the type of vehicle, ~75% have costs between 600€ and 900€, 4% between 900€ and 1,500€, 2% between 1,500€ and 4,800€, and 1% between 4,800€ and 10,500€; collisions with costs >10,500€ are <1%; the rest have costs <600€. <sup>21</sup> Therefore, it has been considered that all collisions with victims in Catalonia would have had material costs, using the cost of 600€ in the base case; in the sensitivity analysis, the cost of 900€ has been considered, and 1% of the collisions with a cost of 10,500€ has been added (Table 1).

## Administrative Costs

It has been considered that there is an additional administrative cost when compensations have to be managed. According to data from insurance companies, administration costs in year 2007 accounted for 10.12% of car insurance premiums.<sup>22</sup> In a similar way, it has been assumed that administrative costs of managing compensations would be 10.12% of the value of compensations. We applied the mean compensation cost of 342€ for slight body damages and the mean compensation cost of 5,805€ for severe body damages,<sup>23</sup> to the number of people slightly (86.5%) and severely injured (13.5%) in Catalonia in 2007. Then, the 10.12% of the resulting amount was included.

## Police, Fire Fighters, and Road Assistance Costs

It has been estimated that the intervention of the police would have a cost of 515.88€ in collisions with severe injured people (13.5%) and a cost of 259.90€ in collisions with slightly injured people (86.5%), updated to 2007 (Table 1).<sup>6,14,20</sup> In a similar way, the intervention of the fire fighters has been estimated to have a cost of 221.37€ in collisions with severely injured people (13.5%) and a cost of 104.48€ in collisions with slightly injured people (86.5%), updated to 2007 (Table 1).<sup>6,14,20</sup> Finally, it has been estimated that road assistance intervention would be necessary in all cases of collisions with victims (26.063 collisions), applying a cost of 135.47€, updated to 2007 (Table 1).<sup>6,14,20</sup>

## Subsidies for Temporary Sick Leave

According to the existing laws regarding welfare benefits for sick leave, under the perspective of the public sector, we took into account all acute hospital and long-term care stays  $\leq 20$  days and applied the 60% of the mean monthly labor cost in Catalonia in 2007.<sup>24,25</sup> For those stays >20 days, we applied the 75% of the mean monthly labor cost (Table 1).<sup>24,25</sup>

## Productivity Losses as a Result of Institutionalization

Under the perspective of the society, acute hospital and long-term care stays have been taken into account, applying the mean labor cost in Catalonia in 2007, correcting for the unemployment rate (Table 1).<sup>24,26</sup>

### Subsidies for Permanent Sick Leave

In the base case, it has been considered only that severely injured (13.5%) would have a permanent sick leave, applying the mean labor cost in Catalonia in 2007, correcting for the unemployment rate (Table 1).<sup>16,24,26,27</sup> In the sensitivity analysis, the time horizon has been broadened to include permanent sick leave of injured people during the rest of their working life. We assumed a mean loss of 40 working years and applied the mean labor cost in Catalonia in 2007, correcting for the unemployment rate.<sup>16,24,26,27</sup> In the sensitivity analysis, it has also been considered 2 months of sick leave for those slightly injured (86.5%), applying a mean labor cost in Catalonia in 2007, correcting for the unemployment rate (Table 1).<sup>14,16,24,26,27</sup>

### Productivity Losses as a Result of Work Sick Leave

Under the perspective of the society, it has been considered that those severely injured (13.5%) would have a year of sick leave, applying the mean work cost in Catalonia in 2007, correcting for the unemployment rate (Table 1).<sup>14,16,24,26</sup> In the sensitivity analysis, the time horizon has been broadened to include productivity losses during the rest of the working life. We assumed a mean loss of 40 working years for those severely injured (13.5%) and applied the mean work cost in Catalonia in 2007, correcting for the unemployment rate.<sup>14,16,24,26</sup> For those slightly injured (86.5%), it has been considered that they had 2 months of sick leave, applying the mean work cost in Catalonia in 2007, correcting for the unemployment rate (Table 1).<sup>14,16,24,26</sup>

### Productivity Losses of Carers

Under the perspective of the society, it has been estimated that those severely injured (13.5%) would need 1.5 hours of medium support per day in the realization of their activities of daily living, with its corresponding cost updated to 2007.<sup>19,20</sup> In the sensitivity analysis, it has been considered 6.5 hours intense support per day in the realization of activities of daily living, with its corresponding cost updated to 2007 (Table 1).<sup>19,20</sup>

### Presentation of Results

All estimations have been performed and reported, following the existing and commonly accepted methodological guidelines. The results are presented in Euros 2007. The results are presented in the form of a base case, and also, a maximum estimation of the sensitivity analysis is presented. To have a relative measure, the cost per injured person has been calculated, using as a denominator the total number of acute hospital admissions.

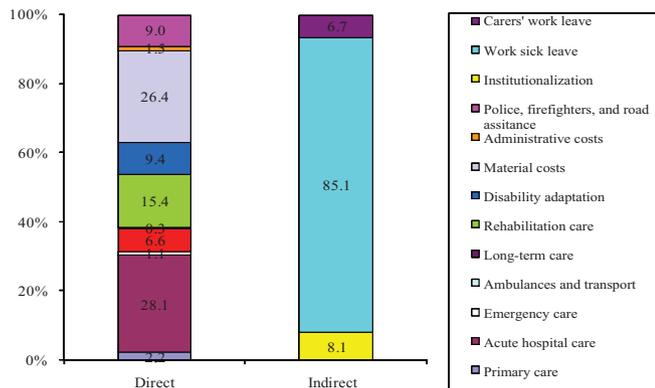
## RESULTS

The results of the calculations for every concept and perspective could be seen in Table 2. From the perspective of the healthcare system, the cost of injured people in traffic collisions was 31,803,034.03€. Of these, the most important part corresponded to acute hospital care (16,645,657.10€; 52% of the total), followed by rehabilitation care (9,105,330.28€; 29%) and ambulances and transport (3,900,921.20€;

**TABLE 2.** Results of the Analysis According to the Perspective of Analysis, Catalonia, 2007

Concept	Healthcare Perspective	Public Sector Perspective	Society Perspective
<b>Direct costs</b>			
Primary care	1,290,536.64	1,290,536.64	1,290,536.64
Acute hospital care	16,645,657.10	16,645,657.10	16,645,657.10
Emergency care	676,747.96	676,747.96	676,747.96
Ambulances and transport	3,900,921.20	3,900,921.20	3,900,921.20
Long-term care	183,830.85	183,830.85	183,830.85
Specialized care	9,105,330.28	9,105,330.28	9,105,330.28
Adaptation to disability	—	—	5,559,987.94 (8,464,835.06)
Disability benefits	—	11,660,969.82 (17,031,014.66)*	—
Material costs	—	—	15,637,800.00 (23,456,700.00)
Administrative costs	—	—	365,100.74
Police, fire-fighters, road assistance	—	5,348,943.72	5,348,943.72
Total direct costs	31,803,024.03	48,812,937.57 (54,182,982.41)	59,250,925.17 (131,061,042.98)
<b>Indirect costs</b>			
Temporary sick leave	—	13,042,668.24	—
Institutionalization	—	—	6,884,309.25
Permanent sick leave	—	72,191,453.46 (1,396,419,756.48)	—
Work sick leave	—	—	72,191,453.46 (1,396,419,756.48)
Work leave of carers	—	—	5,716,551.00 (24,561,886.41)
Total indirect costs	—	85,234,121.70 (1,409,462,424.72)	84,792,313.71 (1,427,865,952.14)
Total	31,803,024.03	134,047,059.27 (1,463,645,407.13)	144,043,238.88 (1,558,926,995.12)
Cost/injured person	3,855.38	16,250.10 (177,433.07)	17,461.90 (188,983.76)

The results of the sensitivity analysis are shown in parenthesis. US Euro/dollar = 0.7297; European Central Bank reference exchange rate, 2007 average. Available at: <http://sdw.ecb.europa.eu/browseSelection.do?DATASET=0&FREQ=A&CURRENCY=USD&node=2018794>.



**Figure 1.** Distribution of direct and indirect costs, from the perspective of the society, Catalonia, 2007.

12%). In Figure 1, the distribution of direct and indirect costs could be seen.

From the perspective of the public sector, the cost of injured people in traffic collisions was 134,047,059.27€ (up to 1,463,645,407.13€ in the sensitivity analysis). In this case, indirect costs (subsidies from temporary and permanent work sick leave) were of major magnitude than direct ones: 85,234,121.70€ indirect costs (up to 1,409,462,424.72€ in the sensitivity analysis and 36.4% of the total) and 48,812,937.57€ direct costs (up to 54,182,982.41€ in the sensitivity analysis and 63.6% of the total). Among indirect costs, one could highlight subsidies for permanent work sick leave (72,191,453.46€; up to 1,396,419,756.48€ in the sensitivity analysis). Among direct costs, acute hospital care (16,645,657.10€), but also rehabilitation care (9,105,330.28€), police, fire-fighters, and road assistance (5,348,943.72€); and disability benefits (11,660,969.82€ and up to 17,031,014.66€ in the sensitivity analysis) stand up.

Finally, from the perspective of the society, the costs of injured people in traffic collisions are 144,043,238.88€ (up to 1,558,926,995.12€ in the sensitivity analysis). Indirect costs were more important than direct ones (84,792,313.71€ and up to 1,427,865,952.14€ in the sensitivity analysis). Productivity losses as a result of work sick leave represented 85% (72,191,453.46€ and up to 1,396,419,756.48€ in the sensitivity analysis). Among the direct costs, acute hospital care (16,645,657.10€; 28% of the direct costs); material costs (15,637,800.00€; 26%); rehabilitation care (9,105,330.28€; 15%); and police, fire fighters, and road assistance (5,348,943.72€; 9%) were the most important ones. The distribution of direct and indirect costs from the perspective of the society could be seen in Figure 1.

The cost per injured person ranged from 3,855.38€ from the perspective of the healthcare system to 16,250.10€ from the perspective of the public sector (up to 177,433.07€ in the sensitivity analysis) and to 17,461.90€ from the perspective of the society (up to 188,983.76€ in the sensitivity analysis).

## DISCUSSION

The results of the analysis showed that, from the perspective of the healthcare system, the cost of injured

people in traffic collisions in 2007 was 31,803,024.03€; from the perspective of the public sector, it was 134,047,059.27€ (up to 1,463,645,407.13€ in the sensitivity analysis), and from the perspective of the society, it was 144,043,238.88€ (up to 1,558,926,995.12€ in the sensitivity analysis). The cost per injured person ranged from 3,855.38€ from the perspective of the healthcare system to 17,461.90€ from the perspective of the society (up to 188,983.76€ in the sensitivity analysis).

One could point out the relative importance of indirect costs (either in the form of subsidies for temporary or permanent work sick leave or in the form of productivity losses as a result of institutionalization, work sick leave, or productivity losses of carers), which offset direct costs. As a matter of fact, injuries—even those considered slight—have been identified in the literature as a source of costs, mainly because of their frequency (in the present analysis, we considered that of the 8,249 injured, 86.5% were slight) and their extended morbidity.<sup>28–30</sup> Among direct costs, one could highlight acute hospital care costs, as well as specialized care, police, fire fighters, and road assistance; and disability benefits also have a lot of importance.

The results of this study are in the line of others done in Spain. Comparing this study with the previous ones, the included costs have been the same ones; the values and the number of cases vary according to information sources, assumptions made in the analysis, and prevalence values. It is worthwhile mentioning that this study limits itself to calculating the cost of injured people in traffic accidents, whereas all the former studies took into account injured people and deaths. This is the reason why resulting costs are lower. It is also worthwhile commenting that all previous studies have included higher administration and material costs.

The imputation of the different concepts of costs to a specific disease—in this case, injuries caused by traffic collisions—is not exempt from practical issues, like the difficulty to assign a global cost to a year or to a specific activity. We used a “bottom-up” estimation, in contrast with the other estimations, “top to bottom.” In other words, our estimations have not been made using attributable fractions applied to total costs for each concept; instead, we made our estimations using the epidemiologic information available and applying reimbursement tariffs or mean costs to each case. This makes the estimations far more conservative because the lack of information in some cases or the low quality of the existing registries in others has made some of the calculations impossible. On the other hand, the main limitation of working with attributable fractions is the overestimation of costs because a proportion of the global cost is assigned to each of the concepts. If this percentage is not accurate enough or varies depending on what is being analyzed, inaccuracies can be introduced in the calculations.

As it has been mentioned, each cost has been included in the estimation according to the perspective of analysis considered. For instance, from the point of view of the society, subsidies are transfers that the State does in favor of persons who fulfill a series of requirements, without the wealth of the country being reduced, for which they do not

suppose an additional social cost and have not been included in the analysis.<sup>31,32</sup> However, from the perspective of the public sector they suppose an additional expense and for that they have been taken into account. It is also worthwhile clarifying that to calculate the productivity losses, we used the mean gross monthly work cost, including workers remuneration and social security contributions paid by the employer. The inclusion of contributions is justified because this value reflexes the social value of the productivity of a worker (in other words, the availability to pay revealed by the company), and not only the individual private value.<sup>33</sup>

Compensation costs have not been included because they beared by insurers and therefore cannot be included neither under the perspective of the healthcare sector nor in the perspective of the public sector; under the perspective of the society, it would be incorrect to include them because they are transfers from the insured persons to the injured ones.

Like in any study of cost of the illness, the estimations made are not absent from limitations; the majority of them related with the lack of information about some aspects of resource consumption, which the estimation of a money value has made impossible for some concepts. For instance, firstly, it is possible that the number of collisions with victims is underestimated, given that the source of the data are the police, and they only record those collisions where they intervene. In a similar way, it is possible that the number of acute hospital and long-term care episodes and stays is underestimated because private hospitals paid by insurance companies are not forced to inform the registries.

Second, again the lack of information made impossible to take into account the cost of technical aids for people with visual or hearing disabilities resulting from a traffic collision, given that the number of cases was not known. However, we could assume that this number is very small.<sup>21</sup> Also, the use of mean values to estimate adaptation costs caused by disability and the amount of money grants could make some results not completely accurate. Moreover, related with the lack of information, the data on the severity of injured people comes from the police and their classification does not follow clinical criteria. Some researchers have calculated severity using the diagnoses stated in the hospital registry, which is not free from limitations because there may be missing cases and incomplete registries.

Third, the lack of detailed information about costs of research and prevention policies in traffic collisions made impossible to include them because it was the case for traffic congestion costs.<sup>34,35</sup>

However, in other cases, the imputation of some costs is controversial. This would be the case of administration costs that some studies include in their whole. In this study, we decided to include only the marginal cost related with the management of compensations and to exclude the rest of administrative costs, considering that they would exist regardless of the eventuality of the traffic collision and the injury.

Results of cost of illness studies are a good basis to quantify a health problem and to evaluate the efficiency of the interventions available to address it. In our context, in the past years, many policies (driving license point system, installa-

tion of speed cameras, speed enforcement, etc) have been carried out, and their effectiveness has been scarcely evaluated and not all its efficiency.<sup>36</sup> The present information, with an exhaustive revision of information sources and bibliography, is a good starting point for the evaluation of these recent interventions.

As we have mentioned, the reduction of traffic collisions is one of the goals of the European Commission for this decade.<sup>8</sup> As a matter of fact, many of the proposed measures are supported by economic evaluation studies proving their efficiency. Among them, we could find the installation of speed radars, the utilization of airbags, the compulsory use of helmet, and the use of lights during the day.<sup>37–40</sup> The importance of the costs of those injured in traffic collisions is an additional argument, besides their epidemiologic and social impact, to start off prevention policies.

## REFERENCES

1. Peden M, Scurfield R, Sleet D, et al., eds. *World Report on Road Traffic Injury Prevention*. Geneva, Switzerland: World Health Organization; 2004.
2. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet*. 2006;367:1747–1757.
3. Peiró R, Seguí-Gómez M, Pérez K, Miralles M, López A, Benavides FG. Lesiones por tráfico, de ocio y domésticas y laborales. Descripción de la situación en España. Informe SESPAS 2006. *Gac Sanit*. 2006;20(suppl 1): 32–40.
4. Cubí P, Herrero C. *Evaluación de riesgos y del impacto de los accidentes de tráfico sobre la salud de la población española, 1964–2004*. [Dissertation]. Bilbao, Spain: Fundación BBVA; 2008.
5. Llàcer A, Fernández-Cuenca R, Martínez de Aragon MV. Mortalidad en España en 1998. Evolución en la década. (I) Mortalidad General, principales causas de muerte y años potenciales de vida perdidos. *Boletín Epidemiológico Semanal*. 2001;9:241–244.
6. Servei Català de Trànsit. *Anuari estadístic d'accidents a Catalunya 2007*. Barcelona, Spain: Servei Català de Trànsit; 2008.
7. European Commission. *White Paper. European Transport Policy for 2010: Time to Decide*. Luxembourg: Office for Official Publications of the European Communities; 2001.
8. European Commission. *Saving 20000 Lives on Our Roads. A Shared Responsibility. European Road Safety Action Programme. Halving the Number of Road Accident Victims in the European Union by 2010: A Shared Responsibility*. Luxembourg: Office for Official Publications of the European Communities; 2003.
9. Servei Català de Trànsit. *Pla de Seguretat Viària de Catalunya 2008–2010*. Barcelona, Spain: Servei Català de Trànsit; 2008.
10. Pereira R. Aspectos socioeconómicos dos accidentes de tráfico en Galicia. *Revista Galega de Economía*. 2007;16:1–20.
11. López J, Serrano P, Duque B, Artiles J. Los costes socioeconómicos de los accidentes de tráfico en las Islas Canarias en 1997. *Gac Sanit*. 2001;15:414–422.
12. García-Altés A, Pérez K. The economic cost of road traffic crashes in an urban setting. *Inj Prev*. 2007;13:65–68.
13. López J, Serrano P, Duque B. The economic costs of traffic accidents in Spain. *J Trauma*. 2004;56:883–889.
14. Lladó A, Roig R. *El coste de los accidentes de tráfico en España en 2004. Una consideración especial de la accidentalidad entre los jóvenes. A: Comisión de expertos para el estudio de la problemática de los jóvenes y la seguridad vial. Jóvenes y conducción: un derecho y una responsabilidad*. Barcelona, Spain: Fundación RACC Automóvil Club; 2007.
15. Racioppi F, Eriksson L, Tingvall C, et al. *Preventing Road Traffic Injury: A Public Health Perspective for Europe*. Copenhagen, Denmark: WHO; 2004.
16. Dirección General de Tráfico. *Las principales cifras de la siniestralidad vial. España 2007*. Madrid, Spain: Dirección General de Tráfico; 2008.
17. Diari Oficial de la Generalitat de Catalunya (DOGC). *Ordre SLT/383/*

- 2007, de 4 d'octubre, per la qual es determinen, per a l'any 2007, els preus unitaris i la resta de valors a què es refereix l'article 5 del Decret 179/1997, de 22 de juliol, pel qual s'estableixen les modalitats de pagament que regeixen la contractació de serveis sanitaris en l'àmbit del Servei Català de la Salut. Núm 4997. Barcelona, Spain: DOGC; 2007.
18. Diari Oficial de la Generalitat de Catalunya (DOGC). *Ordre PRE/339/2007, de 7 de setembre, per la qual s'estableixen, per a l'any 2007, els valors de les unitats de pagament per a la contraprestació dels serveis duts a terme pels centres sociosanitaris en el marc del programa Vida als Anys*. Núm 4979. Barcelona, Spain: DOGC; 2007.
  19. Observatori Social de Barcelona. *El greuge comparatiu econòmic de les persones amb discapacitat de la ciutat de Barcelona*. Barcelona, Spain: Ajuntament de Barcelona, Institut Municipal de Persones amb Discapacitat; 2006.
  20. Idescat. Economia. Estructura. Índex de preus de consum (IPC). Per grups de productes. Catalunya 2008. Available at: <http://www.idescat.cat/economia/inec?tc=3&id=5801>. Accessed July 14, 2010.
  21. UNESPA. *Memoria social del seguro espanyol 2007*. Madrid, Spain: UNESPA; 2008.
  22. Asociación ICEA. *Investigación cooperativa entre entidades aseguradoras y fondos de pensiones. El seguro de automóviles. Siniestralidad por garantías. Estadística año 2007*. Madrid, Spain: Asociación ICEA; 2008.
  23. Instituto de Estudios de Automoción. *El sector del transporte en España y su evolución: Horizonte 2010*. Madrid, Spain: Instituto de Estudios de Automoción; 2002.
  24. Idescat. Cojuntura. Cost laboral. Hores per treballador i mes. Catalunya. IV trimestre 2007. Available at: <http://www.idescat.cat/economia/inec?tc=3&id=0708&dt=200704&ok=Confirmar>. Accessed July 14, 2010.
  25. Ministerio de Trabajo e Inmigración. Guía Laboral. Prestaciones del régimen general de la Seguridad Social. Incapacidad temporal. Available at: [http://www.mtas.es/es/guia/texto/guia\\_13/contenidos/guia\\_13\\_32\\_3.htm](http://www.mtas.es/es/guia/texto/guia_13/contenidos/guia_13_32_3.htm). Accessed July 14, 2010.
  26. Idescat. Cojuntura. Taxes d'activitat, ocupació i atur. Per sexe i edat. Catalunya. IV trimestre 2007. Available at: <http://www.idescat.cat/economia/inec?tc=3&id=0608&dt=200704&ok=Confirmar>. Accessed July 14, 2010.
  27. Ministerio de Trabajo e Inmigración. Guía Laboral. Prestaciones del régimen general de la Seguridad Social. Incapacidad permanente. Available at: [http://www.mtin.es/es/guia/texto/guia\\_13/contenidos/guia\\_13\\_32\\_6.htm](http://www.mtin.es/es/guia/texto/guia_13/contenidos/guia_13_32_6.htm). Accessed July 14, 2010.
  28. McClure R, Douglas R. The public health impact of minor injury. *Accid Anal Prev*. 1996;28:443–451.
  29. Krafft M, Kullgren A, Tingvall C, Boström O, Fredriksson R. How crash severity in rear impacts influences short- and long-term consequences to the neck. *Accid Anal Prev*. 2000;32:187–195.
  30. Ottosson C, Nyrén O, Johansson SE, Ponzer S. Outcome after minor traffic accidents: a follow-up study of orthopedic patients in an inner-city area emergency room. *J Trauma*. 2005;58:553–560.
  31. Drummond MF, Sculpher MJ, Torrance GW, O'Brien BJ, Stoddart GL. *Methods for the Economic Evaluation of Health Care Programmes*. 3rd ed. Oxford, UK: Oxford University Press; 2005.
  32. Gold M. *Cost-effectiveness in Health and Medicine*. New York, NY: Oxford University Press; 1996.
  33. Rice DP. *Estimating the Cost of Illness*. Health Economics Series. No 6. DHEW Publication No. (PHS) 947-6. Rockville, MD: US Department of Health, Education and Welfare; 1966.
  34. Blincoe L, Seay A, Zaloshnja E, et al. *The Economic Impact of Motor Vehicle Crashes, 2000*. Report No. DOT HS 809 446. Washington, DC: National Highway Traffic Safety Administration; 2002.
  35. Hensher D. Integrating accident and travel delay externalities in an urban speed reduction context. *Transport Rev*. 2006;26:521–534.
  36. Pérez K, Mari-Dell'Olmo M, Tobias A, Borrell C. Reducing road traffic injuries: effectiveness of speed cameras in an urban setting. *Am J Public Health*. 2007;97:1632–1637.
  37. Hooke A, Knox J, Portas D. *Cost Benefit Analysis of Traffic Light & Speed Cameras*. Police Research Series, Paper 20. Londres, UK: Home Office Police Research Group; 1996.
  38. Chen G. Safety and economic impacts of photo radar program. *Traffic Inj Prev*. 2005;6:299–307.
  39. Graham JD, Thompson KM, Goldie SJ, Segui-Gomez M, Weinstein MC. The cost-effectiveness of air bags by seating position. *JAMA*. 1997;278:1418–1425.
  40. Graham JD, Corso PS, Morris JM, Segui-Gomez M, Weinstein MC. Evaluating the cost-effectiveness of clinical and public health measures. *Annu Rev Public Health*. 1998;19:125–152.