HEALTH-CARE COSTS OF ROAD ACCIDENTS IN HUNGARY

Prof. Ferenc Irk J.D. D.Sc.

Police High School
H-1121 Budapest, Farkasvölgyi út 12.
HUNGARY

The 1995 survey of the National Institute of Criminology and Criminalistics and Comtrans Ltd. by leading of the author concentrated on the relationship between hospitalisation and severity of injury. The terms used in the analysis are the following: minor, moderate, serious, severe, critical, fatal. This assessment is in accordance with the internationally accepted classification also proposed by WHO. Recovery times relating the Vas county data were used in the cost analysis in the following breakdown.

Expected time of recovery	
0-3 day	4138 = 16.0 %
4-8 day	11367 = 44.0 %
9-30 day	6621 = 25.6 %
31-60 day	2651 = 10.3 %
61-90 day	504 = 1.9 %
over 90 days	436 = 1.7 %
fatal	105 = 0.4 %

In 1993, there were a total 27,108 victims of traffic accidents. Of them 1678 died, 9328 were seriously injured and 16102 lightly injured, according to the Central Statistical Office statistics.
We noted, that about half of the fatally injured were hospitalised. The costs of hospitalisation of the 1993 fatal accident victims amounted to HUF 614,148,000.
The following is a table of the comprehensive values of cost analysis.

ISS1 value	Number of Injured	HUF/person	Total HUF
1 (ISS 1-3)	3,515	63,500	223,202,500
2 (ISS 4-8)	4,274	81,594	348,977,538
3 (ISS 9-15)	1,046	161,528	168,958,288
4 (ISS 16-24	245	422,857	103,599,965
5 (ISS 25-74)	245	1,359,833	333,159,085
6 (ISS 75 fatal)	1,678	366,000	614,148,000
Inpatient	11,006		1,792,045,376
Outpatient	16,102	3,500	56,357,000
Total	27,108		1,848,402,376

According to the table above, the yearly costs of hospitalisation of traffic accident victims amount yearly 2 billion HUF. It is about 12.3 million USD or 10 million ECU. More than 50 % of the costs are taken up by costs of fatal victims and victims with 3-5 ISS1 severity of injury.

HEALTH-CARE COSTS OF ROAD ACCIDENTS IN HUNGARY

Prof. Ferenc Irk J.D. D.Sc.

Police College, H-1121 Budapest, Farkasvölgyi út 12.

1. The precedents of the research

Hungary which has got about 10 million inhabitants experiences some 15.000 road accidents annually, bringing about personal injuries and about 1.300-1.500 fatalities. Losses related to road accidents have got considerable impact on the economic capacity of the country. A certain part of these losses can be measured by financial terms, another part cannot be expressed in this way; one part of the measurable damages is in connection with the personal injuries, the other part originates in property damages.

In the late 1980s, the "Committee on Exploring the Causes of Road Accidents" of the Hungarian Academy of Sciences conducted a full-scale data-survey on accidents in one of Hungary's counties. (1) Each road accident that needed medical assistance was recorded in the survey. Some important conclusions of the study are:

- as far as the fatalities are concerned, the statistical data supply is accurate;
- the overwhelming majority of the serious accidents can also be found in the official statistics on road accidents;
- on the other hand, the majority of the accidents resulting in slight injuries (especially the so-called "single accidents") is not recorded in the statistics on casualties.

In the course of the data procession, the seriousness of the accidents having been studied was also recorded. On the request of the National Health Insurance Fund Administration, the National Institute of Criminology and Criminalistics as well as the Comtrans Ltd., have elaborated the system of viewpoints concerning the degree of severity. (2) This system focuses on the connection between the severity of the injury

and the time the injured person spends in hospital. The starting point is the Abbreviated Injury Scale (AIS) value, that is the index of severity concerning the injured part of the body. The injuries can be characterized on a six-degree scale; they are:

1. slight
2. light
3. medium-severe
4. severe
5. imminent life-danger
6. fatal.

This categorization is in harmony with the classification recommended by the WHO and approved of internationally.

The values of Injury Severity Scale (ISS) have been drawn from the value of AIS, and then, the values of ISS1 could be drawn from those of the ISS. The value of ISS is the AIS-value on the second power, or if there are several injuries, the total of the three most severe injuries squared. (E. g. in case of one severe, one light and one slight injuries $4^2 + 2^2 + 1^2 = 21$) The ISS1 value is actually a reduced and re-coded ISS value whose interpretation follows the interpretation of the AIS (i.e. the categories of slight, light, medium-severe, severe, imminent life-danger and fatal). We have applied the code-interpretation accordingly when calculating the values of the costs given later. (See Table 1.)

We can state that the values of the ISS and ISS1 supply more subtle means for describing the severity and the consequences of the injuries than the statistical data based on police reports that generally use only three groups for describing the injuries: fatal, severe and light. The category "fatal" in international and national statistics on accidents is equal to value 6 of the ISS1; and the category "severe" appears as value 2-5 in ISS1. This latter category in the statistical data supply involves a considerably big number of cases, and very frequently it does not coincide with categories declared medically severe. This fact should be taken into consideration when analyzing the costs of the accidents.

Based on the results of the above-mentioned full-scale survey (covering one single county of Hungary only) as well as measurements taken by the National Institute of Traumatology, (see Table 2.), we can state that:

- about 60% of the injured are given outpatient treatment only;
- in case of fatalities, about half of the victims are taken to hospital;
- more than 50% of the costs cover the hospital treatment of the victims of accidents bringing about death and severe injuries of the value 3-5 in ISS1;
- the hospital treatment of the victims suffering very severe injuries (ISS-value 5) costs twice as much as that of the victims of fatal or slighter (ISS1-value 1-4) injuries, though the former makes up only 0.1% of the total of the casualty.

We can learn from some other studies carried out in Hungary (3) that 15.8-29.7% of the victims of road accidents resulting in severe injuries suffer temporary or final decrease of their working capacity. About one-fifth of them get disabled. Consequently, 3.2-5.9% of the victims of serious accidents who are recorded in statistics will get disabled. In Hungary, it means that in 1993, 1.678 people died in road accidents and 1.536 suffered severe injuries (3-5 in ISS1), but some 42 ... 92 of the latter got disabled.

2. The region-specific features of the degree of seriousness in road accidents

If we compare the data of road accidents in various European countries, we can experience that while the volume of the accidents resulting in personal injuries is the same or similar, the data concerning fatalities are considerably different. The countries we have studied can be divided into three regions:

1. there are lots of accidents, and the total of fatalities is relatively high (the Central-East European region);
2. there are lots of accidents, but the total of fatalities is relatively low (the Western region of the continent);

3. there are few accidents, and the total of fatalities is relatively high (the Scandinavian region).

We can also experience that in most countries the growth of motorization is followed by two opposite trends:

1. the total of injuries shows a slight increase, and the proportions are pretty similar, though the level of motorization is different in these countries, (see Table 3. and Figure 1.);
2. the percentage of the fatalities within the total of the road accidents is slowly diminishing, but the volume and the rate of decrease are considerably different. This results in the fact that there is a difference among these countries concerning the number of fatalities per 100 injuries (see Table 4. and Figure 2.).

A few conclusions can be drawn from the above statements, and some assumptions can also be made:

1. road accidents will certainly require the highest costs in countries where the number of injuries is high and within this number there are lots of fatalities;
2. road accidents will certainly take the lowest costs in countries where the number of the injured is low and within this number there are few fatalities;
3. the costs of road accidents may be lower in countries where there are fewer injuries but the number of fatalities is relatively high than in countries where there are more injuries but fewer fatalities;
4. the costs of road accidents may be higher in countries where the lives of a relatively high percentage of the injured are saved than in countries where there are fewer injuries but the number of fatalities is higher.

These hypotheses should be verified by further studies in various countries, but we assume that in states that have relatively high quality means for saving life, lots of people survive disabled, while they would certainly lose their lives in countries having no such life-saving means.

3. *Methods for calculating costs and some implications*

At present, there are two main methods for costs calculation in Europe to measure the value of human life. (4) They are:

1. the human capital method
2. the willingness-to-pay method.

In the human capital approach, the major component of the cost of a fatality or injury is the lost economic output of the victim. As far as the willingness-to-pay method is concerned, the value of safety or the minimal risk of life is measured by estimating the sum of money people are ready to pay for these values.

Undoubtedly, it is primarily the willingness-to-pay method that can be used to measure the disposition of the inhabitants of a given country or rather its bureaucracy towards safety. However, efforts also have to be made to find out the actual expense items the state organizations should take into consideration brought about by accidents in the field they manage and control. Similarly, we should pay attention to the rate of fatalities and severe injuries (resulting in disability) within the total of accidents. It is an important task, though we know that the results of measurement in various European countries are different in volume. This phenomenon is brought about - partly - by the fact that the term "severe injury" is a kind of "dark field", and in most countries the proportion of accidents resulting in extremely expensive forms of disability is unknown. Without exploring these elements, we cannot answer the question: to what extent the state concerned meets its responsibility to relieve the damages caused by road accidents.

In sum: the above two methods can supply an answer to different questions. The "human capital approach" measures the actual expenses, the "willingness-to-pay approach" examines the citizens' disposition towards safety. Both the study "COST 313" and the report by the European Union on the citizens' demands concerning safety show big differences among the states concerned. Differences can be found in the field of expenses spent on accidents as well as in the citizens' demand for safety. Within the

regions, however, (5) there are also similarities among the countries studied, and it shows that along this line, some common methods can be used to manage the problem.

4. Strategy for prevention in Central-Europe

A new region is going to join the Western and Northern parts of the European continent: first in the field of military policy, then in the field of economy as well. Consequently, it would be desirable to collect the common features of this region, rather sooner than later.

One of the common features of the group of countries extending from the Baltic States to Slovenia is that their economic development is much overdue. (6) The infrastructure in these countries (getting rid of the press by a closed political system less than a decade ago), is rather under-developed. Several elements of safety are still missing, and the citizens' demand for safety is getting intensified very slowly. The states in this region suffer from permanent lack of financial resources, and the governments are faced everywhere with the task of determining their priorities within a number of pressing duties. This kind of transformation has been unprecedented (7), therefore the politicians are just carrying out an absolutely unique experiment: they are trying to lead a huge region from socialism into capitalism.

In order to succeed, the following conditions should be set up:

- the economic and social conditions should be stabilized
- solidarity in society
- the ability to recognize long-term interests
- learning the basic regularities of road accidents
- building a highway network, or constructing a network of motorways of twice two lanes that would guarantee safe traffic
- facilitating the establishment of a pool of modern vehicles that would serve safety.

All the above conditions are needed by the economy of the East-European states to carry the burden brought about by traffic accidents and injuries.

5. Prevention and its impact

5.1. Intervention of cost and costs caused by accidents

First, let us refer to a previous statement that says: more than 50% of the costs come from the costs of hospitals treating the victims of fatal or severe (3-5 in the ISS1) injuries. Consequently, it is our primary task to diminish the number of fatalities or severe injuries bringing about disability. What we first should do is to change the present attitude: though telecommunication frequently reports on accidents and their potentially fatal outcome, it rarely speaks about those who survive but become invalid perhaps forever.

The starting point for prevention is that the participants of traffic should be prepared to believe: they could fall victim of a serious accident that would take their lives or make them disabled, even if they are innocent themselves. The value of human life and health has been traditionally at the bottom of the hierarchy of values in this region of the European continent. People can only be motivated by interests that promise short-term benefits. The financial motivation is definitely the number one priority. However, punishment should also be given its due role as a means to motivate people's behavior within the field of property values.

Another task of ours is to make sure that people cannot easily make behavioral mistakes bringing about grave consequences. It is the way of organizing traffic that can take the leading role in this respect. Further, we should also mention modern vehicles that can relieve the consequences of behavioral errors.

And finally: we should speak about the ways the potential consequences of the actual accidents can be relieved. It is the construction of the vehicles that has got a dominant role in this field. The greater part can (or cannot) have a considerable influence on the

chances of the passengers to survive, and can determine the degree of their potential injuries; the smaller part can influence those of the other people, the partners in traffic.

It should be emphasized that any measures facilitating the protection of human life and good health on a smaller extent than possible, react against the aspect of safety, just as measures that urge people not to enhance their safety or to reduce the level they have already reached do. In Hungary, the present-day system of taxation and insurance, (8) as well as the prospective highway tolls will definitely react against the spreading of a higher-level safety culture. We do not have any system that would motivate people to buy safer cars, or to take care of safety around themselves as pedestrians or bikers. And when tolls are introduced on the highways, lots of people will probably avoid using these parts of the highway network, economizing on their own safety in this way.

5.2. Selection of strategic determinants to enhance compensation of the offended party and improve prevention

The strategic determinants serving safety are the following:

1. Data-survey on accidents should be as full-scale as possible.
2. Efforts to avoid the appearance of human behavioral errors.
3. Averting the consequences of the actual human behavioral errors or relieving their gravity.
4. Learning the causes and causal relations involved in road accidents to draw the conclusions; and with the help of these conclusions (and some more side-conditions) to prevent similar accidents.
5. Informing the society about the fact that due to the accidents the country suffers a great damage; and that these damages can partly be prevented.

Notes:

(1) See: F. Irk, "Conclusions of a county survey on accidents", Munkavédelem és biztonságtechnika, 1991/1., pp. 49-51; F. Irk: "Research on the causes of accidents", Biztosítási Szemle, 1990/10-11, pp. 25-35; F. Irk: "Report of the Committee for Researching the Causes of Accidents. Part II.", Biztosítási Szemle, 1990/12, pp. 14-23; Gy. Kazár, L. Lakner, A. Salamon, A. Szepesi, "The epidemiology of accidents in the light of the Vas county survey", Népegészségügy, 1990/3, pp. 145-149; Gy. Kazár et al., "Child accidents", Orvosi Hetilap, 2 August, 1992., pp. 1937-1943.

(2) This system is very close to the system of viewpoints in the OECD COST 313 study (point 1.1). See: F. Irk, Comtrans Ltd., "The principles and institutions of the integrated prevention of accidents. Final Report for the National Health Insurance Fund Administration.", Budapest, 1995.

(3) T. Varga, "The role of physical condition in transport", in T. Varga (ed. by): Road accidents and their causes in Hungary, Szeged, 1996, pp. 52-92. The research was conducted in the framework of a project financed by the World Bank in 1996, in Szeged (A. Szent-Györgyi Medical School, Institute of Forensic Medicine) and Budapest (National Institute of Criminology and Criminalistics; Ministry of Justice, Department of Statistics).

(4) Transport Accident Costs and the Value of Safety. European Transport Safety Council, Brussels, January 1997, p. 7.

(5) For instance, the same expense items of the injured partly in Greece and Spain, partly in Ireland and Denmark.

(6) In 1997, the per capita GDP in Hungary is about one-third of the average of the EU- states.

(7) That is, the transformation from state-socialism into capitalism has no historical precedents at all.

(8) The essence of the two systems is that the safer is the car, the higher tax and insurance the car owner (i.e. the tax-payer) will pay, since the basis of the sum is the weight and the cubic capacity of the cylinders. The heavier the car, the higher the tax will be, and the higher the capacity of its cylinder, the more expensive its insurance will be. This aspect fails to take into consideration what the experts at road safety recommend (it is true in a number of states, not only in Hungary). According to these recommendations, it would be desirable to encourage the spread of medium-category vehicles.

(9) Data from 1993.

ISS	ASI
1-3	1
4-8	2
9-15	3
16-24	4
25-74	5
75 fatal	6

Table 2.: Classification of the injuries according to severity; their average unit costs and gross expenditure. The figures are based on estimates drawn from data of road accidents in Hungary. (9)

ASSI value	Number of the injured	Percentage	Factor of costs (USD)	Total (USD)
1	3515	13.0	635	2.232.025
2	4274	15.8	816	3 489 775
3	1046	3.9	1615	1 689 583
4	245	0.1	4229	1 036 000
5	1676	0.1	13598	3 331 591
6	11006	6.2	3660	6 141 480
Outpatient treatment	16102	59.4	35	563 570
Total	***27108***	***98.5***		***18 484 024***

Table 3.: Number of injured per 100 accidents

YEAR	AUS	BEL	FRA	GBR	HUN	ITA	NEL	POL	SWE
1980	137,22	124,33	136,24	128,12	125,44	135,72	114,63	114,54	126,36
1981	132,70	126,47	138,97	128,81	127,03	135,55	114,68	117,95	125,36
1982	132,26	123.17	138.82	128,58	124,67	136,20	114,71	117,68	126.09
1983	132,26	122.16	138,97	125,12	126,18	136,06	114,95	117,33	124.96
1984	129.12	121.94	140,08	126,28	128,32	136,47	114.35	125.81	124,83
1985	129.26	123,25	141,19	127,60	126,97	79.76	114,41	117.15	129.77
1986	129,49	123,59	139,76	128.05	128,40	105,40	114,91	116.20	129,60
1987	130.15	124,50	138,46	128,79	128,42	129.31	115.32	116,03	130.76
1988	130.74	124,45	138,75	129,41	130.31	137.43	114.63	116,22	132,73
1989	130.19	124.38	138.34	129,74	131,54	134,51	114.16	115,76	130.95
1990	130.89	125,39	138,93	130.84	133.07	136,62	115,90	117.97	132.53
1991	131.13	123.18	138.34	130.94	132.89	141,00	116.59	120,73	131.58
1992	128.49	126.55	138.18	132,50	132.30	141,14	117,72	119,72	132.87
1993	129.18	126.99	137.47	132,05	130,23	-	-	120.27	142.92

Table 4.: Number of fatal victims per 100 injured

YEAR	AUS	BEL	FRA	GBR	HUN	ITA	NEL	POL	SWE
[illegible]	6,53	4,04	1,89	6,84	4,11	3,53	12.98	4,41
[illegible]	6,12	4.07	1,86	6,89	4,14	3,38	12,39	4.23
3.02	6.24	4.22	1,83	6.81	3.92	3.28	12,11	3.93
3,04	6,44	4.53	1.81	6,65	3,75	3,35	11,72	3.93
2.92	5,88	4,49	1,77	6,42	3,54	3,19	11,11	3,88
2,55	5,66	4.22	1,67	7.07	3,54	2.97	11,09	3,91
1986 2,56	5,67	4.63	1,73	6,57	3,63	3,05	10,82	3,90
1987 2,57	5,40	4,54	1,69	6,17	3.27	3,02	10,94	3,85
1988 2.50	5,48	4,32	1,64	6,14	3,04	2,85	11,12	3,56
1989 2,31	6,10	4.46	1,60	6,75	2,96	2,89	12,54	3,84
1990 2,29	5,09	4,56	1,55	6,57	3,00	2,64	12,30	3,43
1991 2,30	5,47	4,67	1.50	6,49	3,12	2,70	12,11	3,54
1992 2,44	6,07	4,58	1,38	6,45	3,08	2,66	11,38	3,66
1993 2,38	6.20	4,79	1,26	6,60	-	-	10,78	3,20

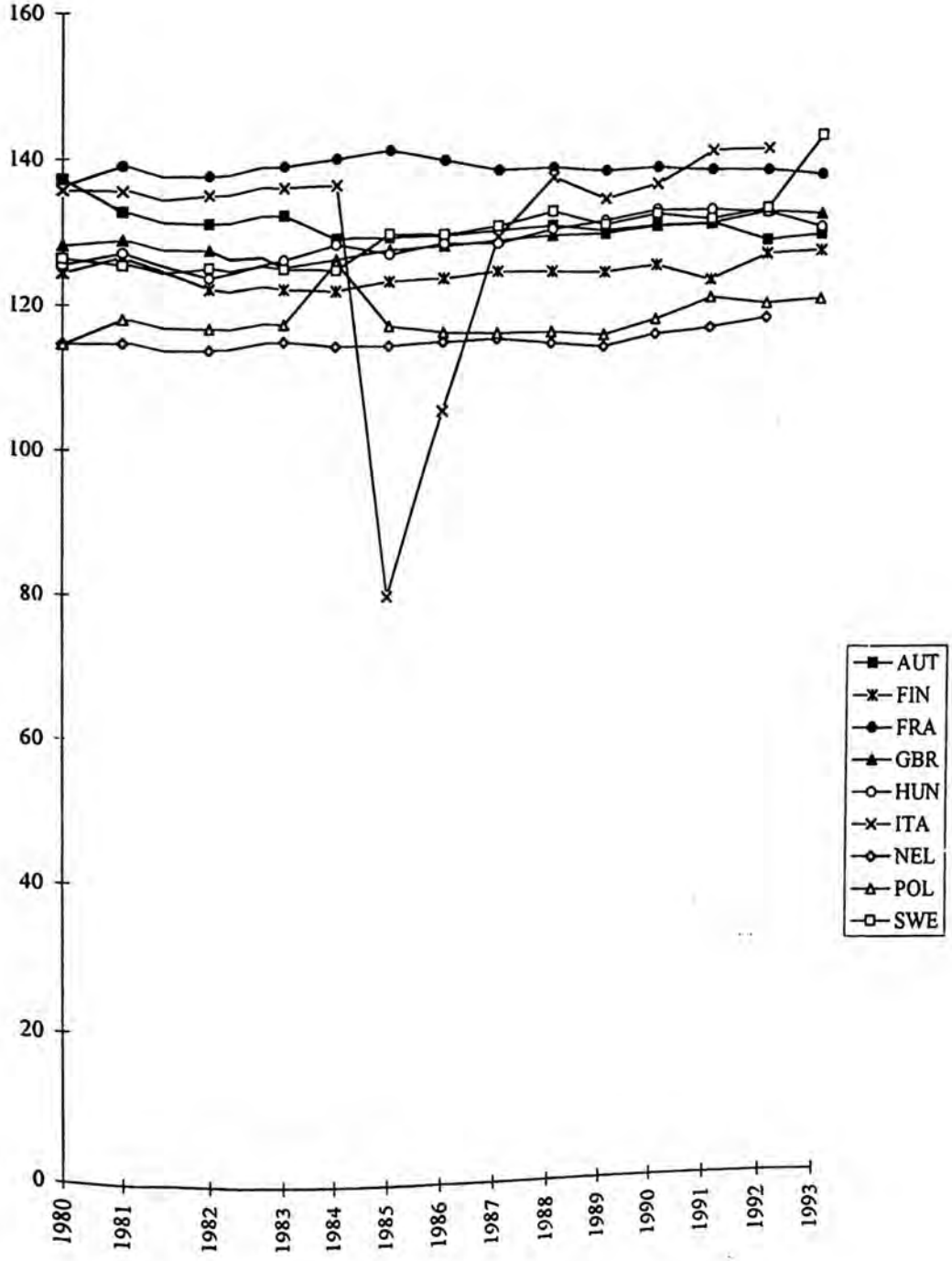
160
140
120
100
80
60
40
20
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
AUT
FIN
FRA
GBR
HUN
ITA
NEL
POL
SWE

Figure 2.: Number of fatal victims per 100 injured