COMPENSATION FOR THOSE INDIRECTLY AFFECTED BY THE DEATH OF A HOUSEHOLD MEMBER

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Abstract. This article demonstrates the size of the budget gap that arises in a household after the death of that member who was the breadwinner of the family. It also describes how this gap can be covered by motor vehicle liability insurance. One source of funding for this gap could be, for example, an annuity for indirect victims. In many EU countries, people who are members of the household of the deceased are considered to be affected as a result of his death. Those indirectly affected will include the family members and relatives of the deceased (spouse, parent, child, sibling, and cohabitant). The person responsible for the death should pay compensation to the family members of the deceased. One of the elements determining this compensation should be the loss of income to the family of the deceased. The second element is compensation for the lost personal contribution. This paper presents the study of literature as an introduction to the relevant issues. The problem of compensation for lost income will be illustrated by legal regulations and calculations based on the account actuarial-term annuity. The study focuses on the selected EU countries. This article is part of a broader study by the author on the material consequences of personal injury and sources of their financing.

Introduction

The term 'personal injury' has not been clearly defined. This might arise from its multifaceted scope, that is, it is related to economics, law, economic analysis of law, and mathematics. However, there are scholarly publications that provide an understanding of this notion (Czchórski 1994, Green 1995, Karaś 2007, Wigmore 1895). For the purpose of this paper, the definition developed by Ilona Kwiecień (Kwiecień 2015) has been invoked: 'Hence, personal injury may be treated as one of the forms of loss consisting of infringement of personal interests (in broad terms) or violation of bodily and health integrity (in narrow terms), or as a set of related adverse consequences.' The legal grounds for determining the compensation for this type of loss are mainly the Civil Code in Poland – Articles 444–447. Similar provisions can be found in other European Codes, such as in the German Code: § 249-254, § 842-846 BGB (Burgerliches Gesetzbuch of 18 August 1896); the French Code: Articles 1382 of the Civil Code of 21 March 1804 and the British Code: the document 'Fatal Accident Act' and Article 8 of the Human Rights Act of 1998.

The financial significance of personal injury for the insurance sector will be demonstrated here, since − in particular − the damages and compensation for pain and suffering disbursed from the third-party liability insurance of motor vehicle owners are the most common source of funding for any incurred financial losses. The number of claims related to bodily injury currently constitute fewer than 13% of all claims in respect of the third-party liability insurance of motor vehicle owners (Insurance Europe 2015, Chart 19*)*, whereas the value of such claims is nearly half of the total benefits and damages disbursed in this type of insurance in Europe; it was 48.4% of the total amount of benefits and damages in respect of the third-party liability insurance of motor vehicle owners in 2013, similar to that of 2012, yet 5 pp. lower than that in 2008. The highest levels of damages were recorded in France, Spain, and Italy. The average claim value in European countries in 2013 amounted to circa EUR 16,000 compared to EUR 15,500 in 2012, EUR 14,500 in 2011, and EUR 13,800 in 2010. The average value of loss arising from MTPL insurance in Europe increased by circa 20% (Insurance Europe 2015,

p. 33*)*. The average claim value differs considerably between various countries and, most importantly, it is continuously growing. When studying the relevant literature, one can encounter publications indicating the sources (legal, social, and economic factors) of such trends, for example, in the study by Holzheu, Lechner (2009). At the same time, it has been emphasised that among the various factors, social attitudes are the most significant factors (Furedi 1990, Enz, Holzheu 2004, Schmit 2009, Carmignani, Giacomelli 2010).

The greatest levels of growth in that period were recorded in Greece (55%), Italy (45%), and France (25%) (Scor Global P&C, p. 34). The highest average claims were recorded in Greece (ca. EUR 33,000), France (ca. EUR 22,000), and Norway (ca. EUR 19,000) in 2013. The lowest average payment amounts were recorded in the Czech Republic (ca. EUR 1,500), Turkey (ca. EUR 4,000), and Estonia (ca. EUR 5,000). When considering these values, it should be noted that the personal injury damages systems differ significantly in individual European countries. This considers, among others, the limits on damages or the possibility to submit new claims if circumstances such as an increase in the costs of claims arise. However, benefits in respect of personal injury are not uniform. The main components are care costs (they constituted almost 54% of all payments made in the period 2010−2011), medical costs (16.4% of all payments), loss of earnings (9.36%), and compensation for pain and suffering (7.32%). This aspect of damage amount still varies between countries. The highest general payment level can be noted in Great Britain, where EUR 15 million per person can be achieved. This is nearly 9 times higher than in the Netherlands and Spain, and 4 times higher than in Italy (Scor Global P&C 2015, p.12). In the Polish insurance market in 2008, roughly 37% of the amount of benefits paid related to large claims (over EUR 100,000), which accounted for only slightly more than 1% of the number of all personal injury claims (to know more regarding this tendency in the Polish market in this area, see Monkiewicz, Monkiewcz 2017, Kwiecień 2011 and Monkiewicz, Monkiewicz 2016).

Compensation should restore the financial situation and the quality of life that the injured persons enjoyed before the accident and take into account the realities of economic and social environment. Such calculations entail a few assumptions (discussed in the section concerning the methodology). Annuities are paid for many years, and they should cover the financial damage that has affected the relatives of the deceased after his death. Most of the amount is determined in relation to the income that the household of the deceased requested. According to the actuarial methodology, losses of earnings are calculated factoring in life expectancy, and in any such analysis, the value of annuity should be divided by age categories and inflation and then methods based on the Net Present Value (NPV) should be employed (for further information, see Jędrzychowska, Poprawska, 2016a).

This article will focus on:

1. annuities for indirect victims. Payments that compensate for lost income.
2. compensation for significant deterioration in the quality of life for family members of survivors.

The purpose of this article is to describe the factors that need to be taken into account when determining the value of economic losses associated with the death of one household member. Theoretical considerations will be illustrated by a computational example showing the scale of the problem.

List of 'close relatives' – indirectly injured

There are three models in which the list of persons entitled (close relatives) to compensation is defined differently.

In a closed model, the list of eligible individuals is closed and those not on the list are excluded. Such a system exists, for example, in England.

In the indirect model, close relatives are considered to be only the closest family members. Such models apply in Poland, Greece and Sweden.

In an open model, there is no complete definition of who is or is not a close relative. Compensation can be received by anyone whose emotional bond has been destroyed as a result of the victim's death. This does not have to be a close relative in the sense of a family member. France, Belgium and Spain employ the open model.

In each legal system, the list of relatives includes spouse, parents and children (own and adopted). Often the list of relatives includes the unborn child, siblings, grandparents, grandchildren, cohabitees, and same sex partners. Therefore, the main criterion for who is a 'close relative' of the victim is − if the victim formed a household with this person or these persons.

Methodology

Loss of income – annuity

With the death of the person providing financial resources to the household, the relatives of the deceased experience a loss of income. Therefore, the natural consequence is compensation for this lost income. It is, therefore, necessary to determine the size of this loss. This is not a homogeneous factor and in part consists of several smaller cash flows.

The most natural connection is parental support for children (own children, adopted children and children who have been granted maintenance). Different countries have different regulations. The differences relate to the time and extent of financial obligations of individual family members to each other. For example, parents have a responsibility to ensure their children continue to be adults (until they reach the age of 18 years), except when a child is unable to work because of a disability. In addition, the parent's obligation to provide parental care for a child does not expire when the child reaches the age of majority, if the child is still in high school, studying at a college or studying at a vocational school. The age up to which parents should support education varies from country to country. For example, in the Netherlands it is 20 years, in Ireland 23 years, in Lithuania 24 years, and in Poland 25 years. For example, Luxembourg does not have extended parental responsibilities over the age of 18 years, and in Germany and Italy, this time is unlimited (i.e., parents must support children both minors and over-aged children, until they become financially independent).

The second natural financial relationship is the property union between spouses. Here there is no time limit.

Another relationship is the support offered to parent by children as they become older. In this situation, the relationship is informal and it is also not time-limited.

There may also be other financial relationships of a voluntary nature, where such financial profit is to be compensated. However, these cannot be potential; rather, they must have existed prior to the occurrence of personal injury or the death of the payer.

The most common way to compensate for lost income is to grant a term-annuity (for children) or an all life annuity (for spouse, parents and disabled child). The amount of such an annuity is dependent on the form (legally or voluntarily determined) and size of the loss. If this was alimony, it remains at the same level. On the other hand, if it was a benefit from living in the same household, there is no clear answer as to what the proper amount to be paid should be.

Before determining the amount of lost income, the net income of the deceased person must be reduced by that part of the income that he himself consumed (self-maintenance cost). In insurance theory, it is assumed that self-consumption or self-maintenance costs amount to about 30% of one's own net income. In Polish social law, this level is between 5 and 15%. For the simulation in this article, a 20% level was assumed. The author of this article is currently working on defining the level of this category of costs for households in Poland and more generally, in the EU countries.

It is possible to adopt a model to calculate the present value of annuity for the two main categories of compensation – spouse (PV_M with payment in the amount A_M) and child (PV_C with payment in the amount A_C).

Payments for a spouse and children (if they are not of a judicial amount) are equal and amount to:

$$A_M = A_C = \frac{0.8 \cdot loss\ net\ income}{N_C + 1} \tag{1}$$

where:

N_C − number of children.

A simulation of several typical annuity payment variants is presented in this section. The simulations were conducted with several groups that had mixed age and gender, and that received different remuneration levels. The analysis was conducted for the Polish economy and for fifteen other countries: Austria, Belarus, Belgium, the Czech Republic, Denmark, France, Hungary, Ireland, Latvia, Luxemburg, Portugal, Slovakia, Slovenia, Spain, and Sweden. This choice of countries was determined by the access to consistent data. These are the EU countries (+ Belarus) for which mortality.org lists the life tables for 2014.

The calculation of the present value of annuities can be done using a life annuity, which is created with the actuarial method using data about the probability of survival and death in the subsequent periods.

As mentioned above, there are no legal regulations determining the level of a single annuity for a victim's close relatives. Thus, the present value of future benefits for an annuity in the amount of EUR 1 payable annually in advance can be expressed as the sum of the product of discounted payments and the probability of survival to the next payment date. This formula can be expanded by supplementing it, for example, by a factor that reflects the future growth of benefits taking into account inflation, and other such factors (in this paper, a geometrical growth has been assumed).

The present value of the surviving spouse's annuity can thus be determined as follows. This is a whole life annuity. However, the model takes into account the fact that, after retirement, the deceased person would transfer the income to the household at a lower rate. So, in the calculation, it was assumed that after the retirement age, the person had an income appropriate to the country's replacement rate (Eurostat data).

$$PV_M = \sum_{k=1}^{x_a} (1+i)^{k-1} v^k {}_k p_{x_m} A_M + \sum_{k=x_a+1}^{\omega} (1+i)^{k-1} v^k {}_k p_{x_m} (r_{rep} A_M) \tag{2}$$

where:

PV_M – the present value of the living spouse's annuity

A_M – the amount of one payment for a living spouse

$x_a = retirement\ age\ in\ the\ country - x$ – lost years of work activity of the victim

x –the age of the victim at the time of death (at the time of accident)

x_m –the age of the living spouse at the time of accident

${}_k p_{x_m}$− probability of survival by the living spouse to the next payment of annuity

ω – maximum life time

r_{rep} – replacement ratio in the country

i – inflation rate

$v = \frac{1}{1+r}$; r − discount rate

The present value of the living child annuity can thus be determined as follows. This is a term life annuity.

$$PV_{C_i} = \sum_{k=1}^{x_{o_i}-x_{c_i}} (1+i)^{k-1} v^k {}_k p_{x_{c_i}} A_C \qquad (3)$$

where:

PV_{C_i} – the present value of the living child annuity

A_C – the amount of one payment for a living child

x_{o_i} – the age of the child up to which he or she should receive benefits from parents

${}_k p_{x_{c_i}}$ – probability of survival of the child to the next payment of annuity.

However, in the case of a child with a disability, the benefit is for the whole life and in this case, it should be similar to that of a spouse's annuity − to take into account the retirement time of the deceased.

$$PV_C = \sum_{k=1}^{x_a} (1+i)^{k-1} v^k {}_k p_{x_k} A_C + \sum_{k=x_a+1}^{\omega} (1+i)^{k-1} v^k {}_k p_{x_k} (r_{rep} A_C) \qquad (4)$$

So, the present value of capital needed to cover the total (for all members of household) loss of income (assuming the spouse and children come from one household) can be expressed as:

$$PV = PV_M + \sum_{i=1}^{N_C} PV_{C_i} \qquad (5)$$

Compensation for significant deterioration of the living situation

In addition to losing the income of a deceased family member, the family also loses this person's non-pecuniary contribution to the household. Some of these things are measurable and can be replaced by buying them from the market, while some of them are neither measurable nor distinguishable.

Examples of measurable and potentially substitutable contributions (suggestions for replacing them are given in parentheses):

- housework (employment of housekeeper)
- childcare (employment of nanny)
- bring children to school or other activities (hire taxis)
- doing homework with children (buying tutoring)
- psychological support for children via personal interaction (meetings with a psychologist)
- free work according to occupation, for example, car mechanic for free repair of family car, doctor free treatment (buy outside service, but only the labour; that is, about 40% of the price of the service is a loss because any materials would have to be bought anyway).
- affiliation to a social security or medical insurance package as a work benefit (buying such health insurance)

- teaching a child certain activity that he himself knows how to do: swimming, skiing, playing instruments (buying a course).

The costs associated with the worsening of living conditions also include those costs that can occur in the household as a result of the death of a relative, such as depression medications or psychological treatment and counselling. This should also be recognized in terms of the financial consequences of personal injury. This is an additional financial burden for the household.

In this calculation, it is possible to use a rising term annuity with annual payments at the beginning of the period.

$$PV = \sum_{i=1}^{K} PV_{N_i} \tag{6}$$

$$PV_{N_i} = A_i q \frac{q^{n_i} - d^{n_i}}{q - d} \cdot \frac{1}{q^{n_i}} \tag{7}$$

where:

K – the number of categories of services that a household purchases to replace a personal contribution to a deceased person,

A_i – the amount of capital needed to buy the service (number i) in the first year (in the following years, the capital will increase by inflation)

n_i – the number of years the household will buy the service (number i)

PV_{N_i} – present value of capital needed to purchase the service (number i)

$q = 1 + r$; r – discount rate

$d = 1 + i$; i – inflation rate

Results

To illustrate the scale of the problem of lost income, we will present an example.

As a result of an accident, John (35 years old) dies. John's income is equal to the national average. John was supposed to work until the age of 70 years.

John's family members eligible for compensation for lost income are:

- 32-year-old Mari – wife
- 7-year-old Tom – son
- 5-year-old Mark - son (disabled)
- 2-year-old Victoria - daughter.

The following assumptions were made in the calculations:

- The annuity is paid once a year, at the beginning of the year (this assumption will slightly overestimate the obtained values, but greatly simplify the calculation);
- The probability of survival is calculated using life tables for each country (the most recent available tables are from mortality.org from 2014; calculations have been made for men and women separately). The upper limit of the sum is the value equivalent age, which was attained by the oldest person accounted for in the creation of the cohort life tables, that is, 110 years.

- It was assumed that since the annuities relate to a long period of time, the economies will stabilise and their development will normalise. Therefore, discounting was based on the EU average rate of return on 10-year treasury bonds (2.86%).

- The level of inflation (according to Eurostat) adopted was i = 1.7662%. This value was determined as the average inflation rate based on the average annual rate of inflation calculated on the basis of ten-year data (from 2004 to 2014) for the countries (excluding Belarus) that adopted the analysis (Eurostat data).

Calculations were made for selected countries. They were made in 2 variants: variant A – compensation up to 18 years of age; variant B – compensation up to 25 years of age for children. As one of the children is disabled, the pension for him is a whole-life one. The average national net salary and replacement rates are set for 2014 (according to Eurostat) and the life tables are for 2014 (according to mortality.org).

Table 1. Present value of annuities - for individuals and total, according to the example (Sources: Author's calculation)

	PV- Mara	PV Tom*	PV Mark	PV Victoria*	PV total*	Related for average
AU	172 192.81	53 618.41 81 792.93	191 289.80	73 980.70 100 696.66	491 081.72 545 972.20	20.37 22.65
BE	180 188.88	55 808.53 85 132.49	201 375.5	77 020.46 104 840.48	514 393.37 571 537.35	20.50 22.78
BY	25 433.78	8 268.88 12 605.44	28 532.82	11 410.70 15 528.09	73 626.18 82 100.13	19.80 22.07
CZ	67 680.45	21 136.75 32 236.65	76 541.92	29 168.52 39 704.42	194 527.64 216 163.44	20.47 22.74
DK	269 122.74	82 616.61 126 072.96	306 080.93	114 013.29 155 207.09	771 833.57 856 483.72	20.78 23.06
ES	165 995.00	45 857.79 69 976.95	187 678.30	63 283.36 86 147.74	462 814.45 509 797.99	22.45 24.73
FR	193 666.40	57 569.05 87 830.33	213 710.79	79 445.51 108 144.24	544 391.75 603 351.76	21.03 23.31
HU	54 350.13	16 330.39 24 910.08	64 356.11	22 540.11 30 682.52	157 576.74 174 298.84	21.46 23.73
IE	197 640.50	65 069.13 99 268.29	215 847.17	89 782.56 122 204.36	568 339.36 634 960.32	19.43 21.70
LU	286 423.66	80 278.91 122 475.23	326 559.12	110 780.78 150 794.75	804 042.47 886 252.76	22.27 24.54
LV	57 862.52	18 745.44 28 582.93	65 237.14	25 878.33 32 219.97	167 723.43 183 902.56	19.88 21.80
PL	87 865.79	28 448.34 43 382.61	97 048.37	39 252.79 53 422.48	252 615.29 281 719.25	19.75 22.02

PT	93 304.22	26 258.87	106 332.72	36 240.64	262 136.45	22.20
		40 060.47		49 333.36	289 030.77	24.48
SI	85 349.37	26 662.23	94 637.95	36 800.53	243 450.08	20.31
		40 677.45		50 094.08	270 758.85	22.59
SK	66 724.78	20 143.04	77 202.13	27 802.63	191 872.58	21.18
		30 718.87		37 839.45	212 485.23	23.45
SE	210 321.05	65 798.06	233 637.85	90 794.60	600 551.56	20.30
		100 387.24		123 589.05	555.19	22.58

* Calculated in two variants: children up to 18 and 25 years old, respectively
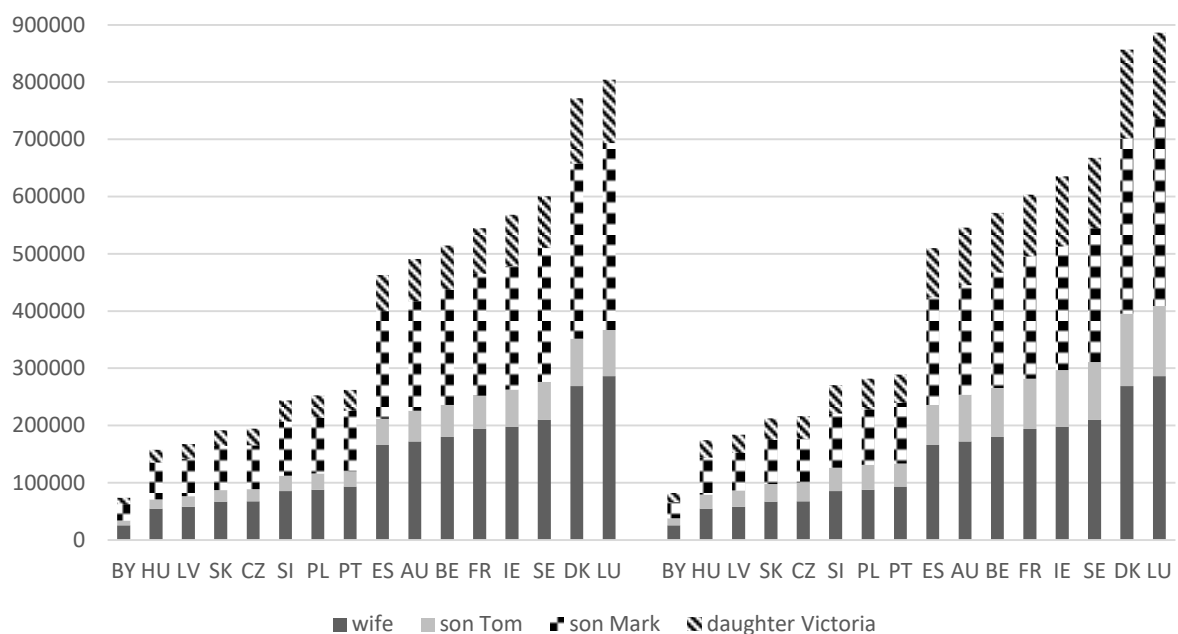
Fig. 1. Present value of annuities in two variants, according to the example (Sources: Author's calculation)

As can be seen from the calculations (Table 1 and Figure 1) for a four-person family with one disabled child, the lost household income is about 20 times the annual income of the deceased. In the author's opinion, this is a significant loss of property, which should be calculated with diligence. Knowing the size of the damage enables a search for ways to fund this loss. The nominal value of this loss differs considerably between the individual countries because it is shaped by two different factors: average salary and life expectancy.

As an illustration of the second part of the compensation, I present an example. This is an initial tentative list of services that can replace the loss, as well as the time and money needed for them. This is a development of an example from the earlier part of the article. Calculations will only be carried out for Poland. These are intended to show the possibility of calculating the size of loss to the household of the non-financial contribution of the victim.

Let us assume that John had his own car workshop. So, he repaired for free 2 of the family's cars. He did not go to work (the workshop was at home). He took the children to school and provided them with after-school care. He also did some housework. He also did gardening. The family was covered by John's company health insurance.

Table 2. List of substitutes for lost victim's non-financial contribution, time range and valuation (Sources: Own work)

Service	Hours a week	Weeks in a year	Number of years	Cost per hour (PLN)
Nanny up to 12 years old the youngest	25	40	10	40
Housekeeper up to adolescence of the youngest (Victoria)	15	40	16	30
Tutoring to 18 years old for Tom	6	40	11	50
Tutoring to 18 years old for Victoria	6	40	12 (after 4 years)	50
Psychological consultations for children	15 10 5	52	11 +2 +3	100
Work in the garden until the age of 60 − John	10	25	25	20
Work on cars up to 60 years old − John	2	52	25	20
	Items per week	Period in a year	Number of years	Unit cost
Transport to school for Tom up to 12 years	10	40 weeks	5	30
Transport to school for Victoria up to 12 years	10	40 weeks	6 (after 4 years)	30
Health insurance: First 15 years for everyone Later, for 30 years only for wife and Mark		 12 months 12 months	 15 +30	 250 150

Taking into account the above assumptions (as well as the inflation and the value of money over time), we receive the present value of capital that would allow you to buy lost services in the market. The present value of this capital is determined as the sum of a rising term annuity. This is an amount of PLN 2 237 605.70, equivalent to about 545 757.49 Euro. This is twice the amount of benefits for lost income (according to the example for Poland).

There are also non-measurable aspects, which should be taken into consideration while measuring the impact of personal injury. In order to set the proper level of compensation, suffering and pain should also be included. The starting point will be the risk of a worsening life situation and decreasing quality of life.

The risk can be reflected by:

- − broken family relationships
- − lowered self-confidence of orphaned children and other psychological results of being part of a broken family
- − possibility of unemployment on the part of the remaining family provider (i.e., due to more parental responsibilities or losing professional credibility as a result of being a single parent)
- − losing social position by a lowering of 'caste'
- − lack of time for self-development
- − lack of time for rest
- − change of residence.

As mentioned above, it is not possible to arrive at a valuation of these damages. The amount of compensation is therefore decided in accordance with the case law of the courts in the country.

Conclusions

The above considerations show that personal injury has a significant impact on a household, including financial implications. Lost income equates to about 20 times the annual salary of the deceased. Non-financial losses, which consist of lost personal contributions, are a loss that can be estimated only in part. The assessable part of personal injury can be measured by the price of services that need to be bought to replace the victim's contribution. The example presented in the article shows that the present value of this damage may be even higher than the loss related to lost income. The second part of personal injury is non-measurable and this should be repaid to the family as part of the compensation referred to as 'compensation for pain and suffering'.

Finally, I will point out several sources of coverage for this loss. They may include:

- social security (in Poland, this is a survivor's pension for the members of the deceased's family but this represents only a fraction of any lost income),
- funds from the perpetrator (employer, driver, medical offender or other guilty party),
- from the insurance policy of the perpetrator (part of this insurance is obligatory. It is worth mentioning here the adequacy of guaranteed sums from such insurance (see Jędrzychowska et al. 2015, Jędrzychowska, Poprawska 2016b),
- from own insurance (e.g., accident insurance, life insurance),
- from own resources and loans from family members and friends,
- from the funds of associations and collections of money.

The article relates to financial losses in households in which one member has died. However, it should be mentioned that this loss may be even greater if the victim has survived, but is in a coma or is completely paralyzed. In such a case, the household not only loses the victim's income and intangible contribution to the household, but also incurs the costs of medicines, and treatment, nursing, and hospital visits.

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