

**MORTALITY FROM EXTERNAL CAUSES OF DEATH
IN THE REPUBLIC OF MOLDOVA***Irina PAHOMII¹,**National Institute for Economic Research, Republic of Moldova**Vitalie ȘTIRBA², Master Student,**National Research University Higher School of Economics, Moscow, Russia*

The Republic of Moldova is among the countries with a high mortality from external causes of death, for males being 2.6 times higher than in the Western European countries and 1.5 times higher for females. The purpose of the study is to analyse trends in mortality from external causes of death and to estimate its contribution to the change of life expectancy at birth between 2000-2014 years. The study is based on the Human Cause-of-Death Database and on the residence population data. The results of the research show that mortality due to external causes of death stagnates for both sexes in 2000-2014 years. A higher level of mortality due to external causes of death is specific for men. External causes of death account for 20% of total increase in life expectancy at birth for 2000-2014 period in case of males, for females the impact of external causes is just over 9%. Mortality due to external causes of death is characterized by a much younger structure compared to general mortality. In case of males over 80% of the total deaths for the 15-19 age group are due to external causes of death. The increase of the share of deaths due to external causes is observed in the 20-24 and 25-29 age group. For males, the main five subgroups of external causes are suicide and self-inflicted injuries, other accidents and late effects of accidents, transport accidents, other accidental breathing threats, accidental poisoning with other substances. For females, there are other causes: other accidents and late effects of accidents, other accidental breathing threats, suicide and self-inflicted injuries, transport accidents, assault. Males mortality for different subgroups from external causes of death is four times higher than that observed for females.

Keywords: *external causes of death, structure, discrepancies, contribution.*

Republica Moldova se situează printre țările cu un nivel înalt al mortalității prin cauze externe de deces, pentru bărbați aceasta fiind mai înaltă de 2,6 ori decât în țările Europei de Vest, iar pentru femei de 1,5 ori. Scopul studiului a constituit analiza tendințelor mortalității prin cauze externe de deces și estimarea contribuției acesteia la formarea diferenței în speranța de viață la naștere între anii 2000-2014. Studiul se bazează pe datele din Human Cause-of-Death Database și datele cu privire la populația rezidentă. Rezultatele cercetării demonstrează că mortalitatea prin cauze externe de deces în perioada 2000-2014 stagnează, iar în grupele de vârstă 20-24 și 25-29 ani este înregistrată o creștere a ponderii deceselor prin cauze externe. Un nivel mai înalt al mortalității prin cauze externe de deces este specific pentru bărbați. Cauzele externe de deces explică 20% din creșterea totală a speranței de viață la naștere pentru bărbați și puțin peste 9% pentru femei. Mortalitatea prin cauze externe de deces este caracterizată de o structură mult mai tânără comparativ cu mortalitatea generală. Pentru bărbați peste 80% din decesele înregistrate în grupul de vârstă 15-19 ani revin deceselor prin cauze externe, principalele cinci subgrupuri ale cauzelor externe de deces fiind: suicidul și autovătămări intenționate, alte accidente și efecte întârziate ale accidentelor, accidente de transport, alte accidente afectând respirația, otrăvirea accidentală prin și la expunerea la alte substanțe. Pentru femei se evidențiază alte cauze principale: alte accidente și efecte întârziate ale accidentelor, alte accidente afectând respirația, suicidul și autovătămări intenționate, accidente de transport, agresiune. Mortalitatea bărbaților pentru diferite subgrupuri ale cauzele externe de deces este de patru ori mai mare decât cea observată în cazul femeilor.

Cuvinte-cheie: *cauze externe de deces, structură, discrepanțe, contribuție.*

Республика Молдова входит в число стран с высоким уровнем смертности от внешних причин, который по сравнению со странами Западной Европы в 2,6 раза выше для мужчин и в

¹ © Irina PAHOMII, bragairina92@mail.ru

² © Vitalie ȘTIRBA, vitalie.stirba@gmail.com

1,5 раза – для женщин. Целью данного исследования является анализ тенденций смертности от внешних причин смерти и оценка ее вклада в изменение ожидаемой продолжительности жизни при рождении в 2000-2014 гг. Исследование основано на данных Human Cause-of-Death Database и данных о наличном населении. Результаты исследования показывают, что за 2000-2014 гг. уровень смертности от внешних причин изменился незначительно, а в возрастных группах 20-24 и 25-29 лет наблюдается некоторое увеличение доли смертей от внешних причин. Внешние причины смерти составляют 20% от общего повышения ожидаемой продолжительности жизни при рождении для мужчин и чуть более 9% для женщин за 2000-2014 гг. Смертность от внешних причин характеризуется гораздо более молодой структурой по сравнению с общей смертностью, среди мужчин более 80% всех смертей в возрастной группе 15-19 лет обусловлены внешними причинами смерти. Для мужчин основные пять подгрупп внешних причин составляют самоубийства и преднамеренное самоповреждение, транспортные несчастные случаи, другие несчастные случаи и отсроченные последствия несчастных случаев, другие несчастные случаи с угрозой дыханию, случайное отравление и воздействие другими веществами. Для женщин основные подгруппы причин составляют: другие несчастные случаи и отсроченные последствия несчастных случаев, другие несчастные случаи с угрозой дыханию, самоубийства и преднамеренное самоповреждение, транспортные несчастные случаи, нападения. Смертность мужчин в подгруппах внешних причин смерти в четыре раза выше, чем у женщин.

Ключевые слова: внешние причины смерти, структура, различия, вклад.

JEL Classification: J10, J17, J19.

UDC: 314.42(478)

Introduction

According to WHO data, mortality from external causes of death is in the 10 top leading causes of death across all countries. Mortality from external causes of death in the European Union countries is the fourth leading cause of death in the total population of EU 28. About 60% of all deaths in the 20-24 age group are from external causes of death. There are regional variations of up to four times between mortality rates from external causes of death among countries in the region [16]. The main cause is the suicide followed by other accidents, unintended falls and transport accidents.

At the same time, there are substantial discrepancies between the Eastern and Western European countries mortality patterns, which lies not only in the level of mortality rates but also in the probability of the newborn death, due to a particular cause. Thus, the specificity of the mortality pattern in the Eastern Europe differs from that in the Western Europe by the excessive mortality from external causes, especially in the case of males [12].

The issue of death from external causes of death is more important in low and middle-income countries [17]. This is largely determined by the high costs involved in reducing it. At the same time, reducing mortality from external causes is expressly stipulated in the Sustainable Development Goals promoted by the member countries of the UN [11].

The Republic of Moldova is among the countries with a high mortality from external causes of death, being 2.6 times higher for males than in the Western European countries and 1.5 times higher for females [9]. The leading cause is suicide, followed by accidental falls, drowning and exposure to electricity or fire and third – transport accidents. Moreover, the mortality from external causes of death, in the context of premature mortality, is the most important cause of death among males in the Republic of Moldova [7].

External causes of death include a heterogeneous collection of events including the three major categories – suicide, homicide, and accidental death. These causes of death represent a significant proportion of potentially preventable mortality and an important source for increasing life expectancy at birth. Reducing the number of deaths of children and adolescents is a priority of the health policy of many countries [4].

External causes of death such as accidents and violence, include environmental events, circumstances and conditions as the cause of injury, poisoning, and other adverse effects [3]. Deaths from external causes are not caused by certain diseases, but rather by some external factors that physically influence the human body through mechanical, chemical, thermal and radiation afflictions that go beyond the physiological defence threshold of the body or by depriving it of some vital elements [15]. Thus, the quality of

infrastructure, the political and economic situation, the environment, the professional activities of the population, but also other factors, play a special role in the mortality intensity from these causes. Respectively higher income countries have lower rates of mortality due to external causes than lower and middle-income countries.

Socio-economic factors have the greatest impact on external causes of death. They have the ability to determine the appearance or strength of exogenous or endogenous factors, aggravating or neutralizing their impact.

Due to unstable general socio-economic situation, healthy practices – disease prophylaxis, periodic medical consultation, a healthy diet and a physical activity – are neglected that lead to poor health behaviour. Therefore, even the health is at the top of population values, the culture of healthy behaviour is still not a priority. Socio-economic factors in this respect have strong links with behavioural factors, the links being valid in both directions. At a time when people with low living standards cannot meet their basic needs health is not seen as a goal itself, but as an instrument by which a better living standard can be achieved, or certain goods can be acquired.

Another important factor that generates discrepancies in mortality from external causes of death is sex. Thus, for males there is a higher level of mortality from external causes of death. This is due to certain aspects of the male's professional and recreational activity, which usually present a higher risk than for females. In addition, males have a more irresponsible attitude towards their own health. Thus, even if males assess their own health at a higher level than females, healthy practices are still not a priority for them, self-care being considered a feminisation of male behaviour [17].

The previous studies realized for Eastern Europe countries demonstrated that the most affected age group of deaths from external causes is the working-age population leading to loss of human capital. The comparative analysis demonstrates the different pattern of overall mortality rates observed in Russia compared to other developed countries that provide a firm stance on external causes of death in the top three leading causes of death, but also on the different structural pattern. Sex differences are limited to the mortality rate rather than its structure, with differences being noted only in the first five causes of death – suicides, transport accidents, falls, accidental alcohol poisoning, accidents of unknown character [13, 15]. Mortality from external causes in urban and rural populations strongly correlates with the education level. Educational inequalities have increased throughout the period of socio-economic transition. The greatest educational inequalities were observed in suicide mortality, especially among males [6]. High suicide rates across Eastern Europe have been correlated with the post-Soviet transitional period and the societal changes associated with that transition. Despite a gradual decline in suicide mortality over the past decade, Eastern European countries still have one of the highest suicide rates in the world. It is determined by the sweeping social change and growing economic polarization that has been occurring over the past two decades during transition to a “new society” [5, 10].

The situation regarding the mortality from external causes of death in the Republic of Moldova was analysed by Penina O., Vallin J., Meslé F. [14]. It highlights the periods of growth and mortality reduction by external causes of death for both sexes, pointing to existing discrepancies. Thus, for males, mortality from external causes of death increased from 1965 to the late 1970s, afterwards a stabilization was registered until 1985. The period 1985-1987 is characterized by a sudden reduction followed by another period of sudden growth until 1995. After 1995 until the beginning of the 2000s, mortality rates due to external causes of death in the case of males decreased, but this is followed by an unfavourable period of mortality growth in 2001. Since 1985 females are experiencing lower fluctuations in mortality rates due to external causes of death and has been observed a strong trend of mortality reduction from external causes of death. However, it was eventually followed by a stagnation period. The authors concluded that the increase in mortality from external causes of death is largely determined by the increase of mortality in the age group over 35 years. There was a reduction in mortality from external causes of death in the younger age group.

The mortality by transport accidents was studied by Bargan N. [2]. Thus, the research showed that the most affected age group by this cause of death is 20-39 years. It has also been found that pedestrians are more often victims of transport accidents than drivers are or their passengers.

The aim of this study is to analyse trends in mortality from major external causes of death and to assess the contribution of external causes of death to life expectancy at birth.

This study is focused on the evolution of mortality from external causes since the beginning of that century and is limited to the years 2000-2014. The 2014 is the last available year in the used sources.

Availability and quality of causes of death data

An important problem regarding the statistical data for the Republic of Moldova is the number of exposed to risk population. Because the country has high levels of emigration, there are substantial differences between the de facto and the de jure population numbers. For the correct mortality calculation, including from external causes of death, data on the number and structure of the resident population of the Republic of Moldova estimated by Penina O., Jdanov D. and Grigoriev P. were used. The life tables used in that study were taken also from that source [8].

Data on causes of death were taken from The Human Cause-of-Death Database, which are in accordance with the ICD-10. Data on the distribution of deaths by causes, the age-specific death rates and the standardized death rates from the shortlist and intermediate list were selected. The method of components of Andreev E. was used to perform the decomposition of mortality [1].

Main results

The external causes of death account for about 8% of the total deaths recorded during the year 2014 (Fig. 1) and ranked fourth among other major causes of death. This share is maintained throughout the analysed period 2000-2014. Thus, based on the data on the number of deaths from major causes of death, over the period 2000-2014, there were 53 thousand deaths from external causes for both sexes or 8.4% of total number of deaths. The fact that the share of deaths due to external causes for the whole period coincides with the share recorded for the last analysed year denotes the stagnation of the phenomenon over time. This is also confirmed by the very close share of mortality from external causes of death recorded for the years 2000 and 2014. The attested reduction was insignificant - 0.4% (Fig. 2).

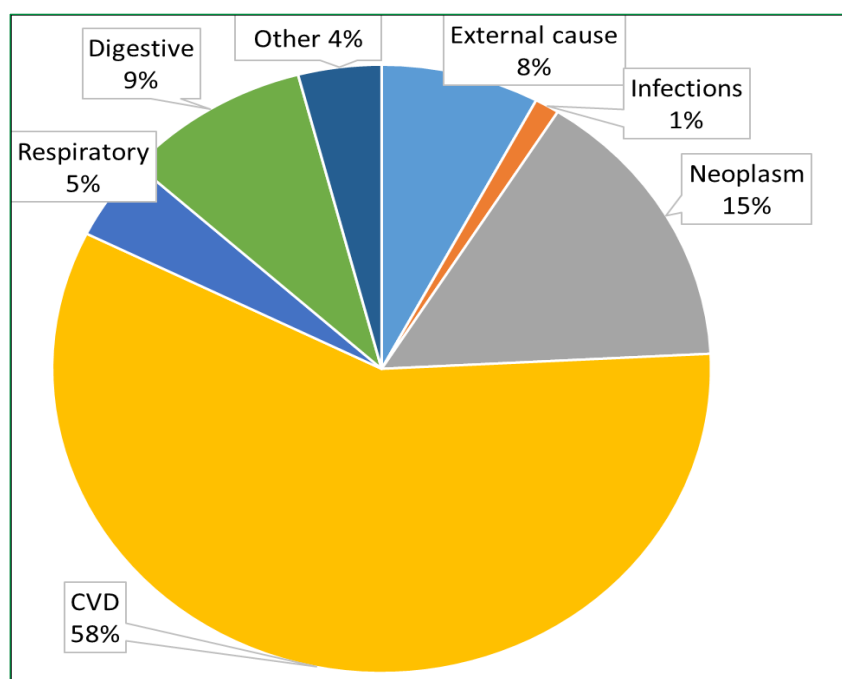


Figure 1. Share of deaths by major causes of death in total number of deaths, both sexes, 2014

Source: *The Human Cause-of-Death Database.*

The analysis of external causes of death from a sex perspective highlights major gender differences. Thus, mortality from external causes of death is a predominant problem for males. This situation continues over time. The mortality from external causes of death for males in 2000 was the second main cause of death. In 2014 the external causes of death ranked third. This decline was largely determined by the increase in deaths by tumours and less by the reduction in mortality from external causes of death. The share of mortality from external causes of death was reduced by only 0.5%. The reduction for females is also insignificant, but mortality from external causes of death is not a top cause. In addition, the gap between males and females remained the same in the analysed period, representing 8.3-8.4% to the detriment of males (Fig. 2).

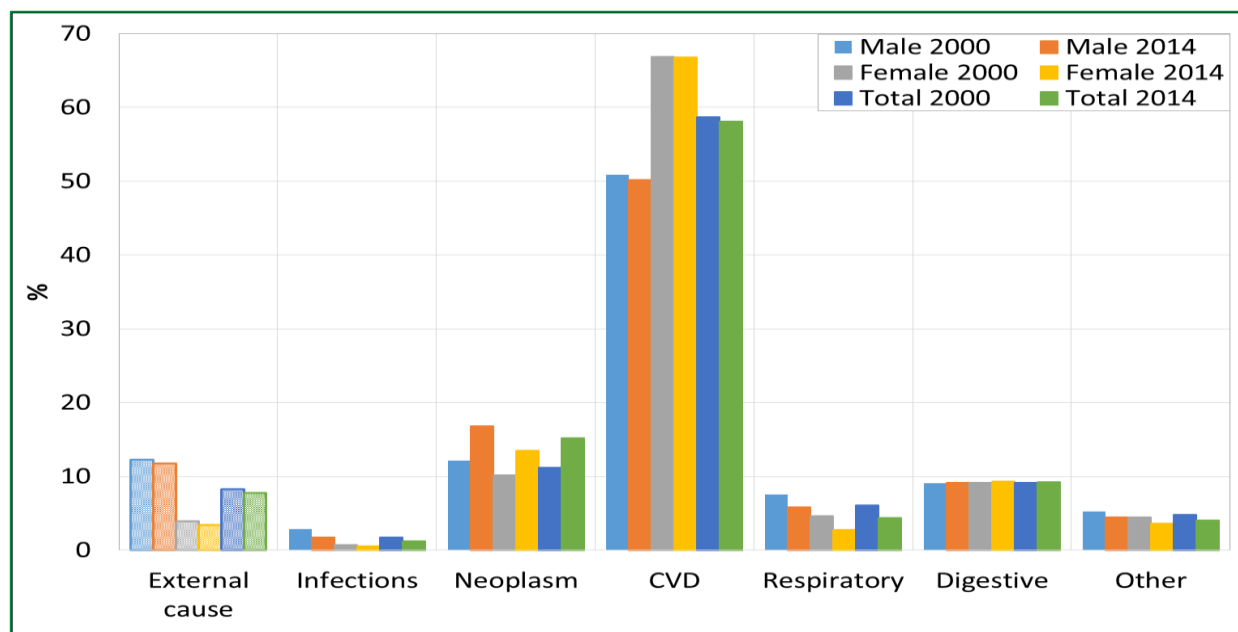


Figure 2. Share of major causes of death by sex, 2000, 2014

Source: *The Human Cause-of-Death Database.*

The analysis of the evolution of the standardized mortality rate from external causes of death demonstrated the stagnation of the indicator in the period 2000-2014. We have to mention that stagnation was characteristic for both sexes. In addition, SDR for external causes of death for males is four times higher than that for females. Differences between females and males have remained at the same level for the entire analysed period (Fig. 3).

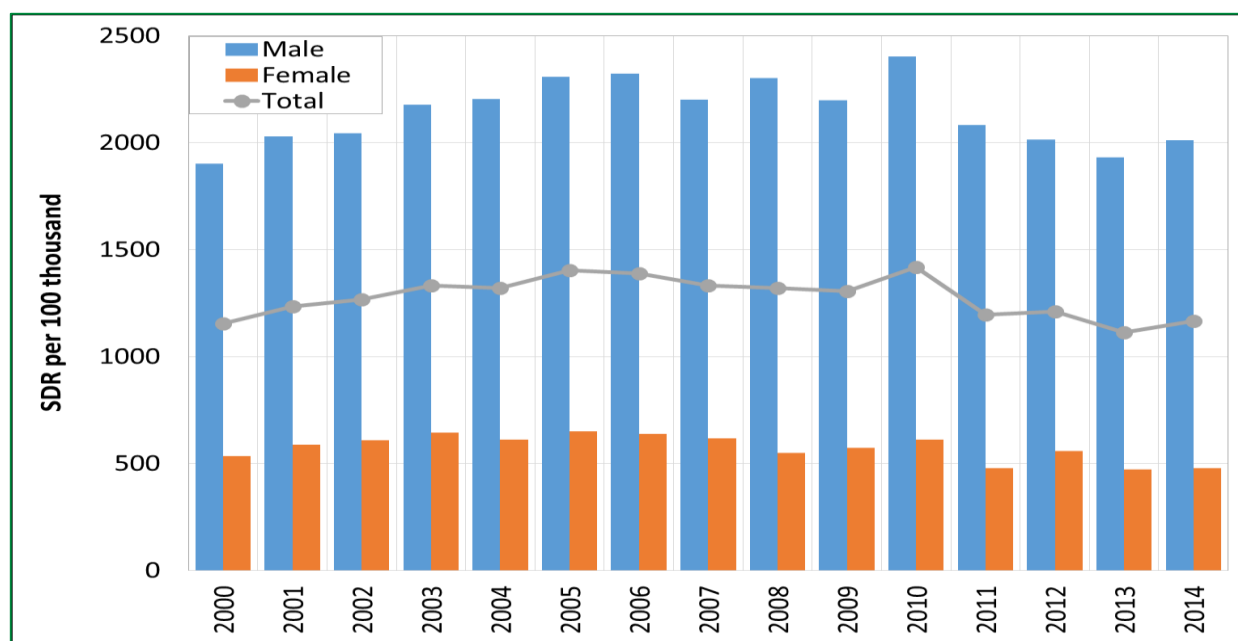


Figure 3. Dynamics of SDR for external causes of death, by sex and total population, 2000-2014

Source: *The Human Cause-of-Death Database.*

The contribution of mortality from external causes of death to the difference in life expectancy at birth for 2000-2014 period for males and females has very similar absolute values. The absolute contribution of external causes of death to the difference in life expectancy for the years 2000-2014 was 0.3 years for males, and 0.2 years for females (Table 1).

The analysis of these values in the context of total gains in life expectancy at birth denotes another situation. For males, life expectancy at birth in the period 2000-2014 increased by 1.5 years, while for females the increase was practically double, i.e. 2.6 years. Thus, the contribution of external causes of death for males represents 20% of total changes in life expectancy at birth for the period 2000-2014, while for females slightly over 9%.

Table 1
Total contribution of external causes of death in the formation of differences in life expectancy, by sex, 2000-2014

	Males	Females
e_0 for 2000, years	63.4	71.1
e_0 for 2014, years	64.9	73.7
The difference in e_0 for 2014-2000, years	1.5	2.6
Total contribution of external causes of death in difference of e_0 , years	0.3	0.25
The share of the contribution of external causes of death to the difference e_0 (%)	19.9%	9.4%

Source: Author's calculations based on mortality life tables.

Sex differences are observed not only on a general level, on total external causes, but also on a structural level – on the age structure of mortality and on certain subgroups of external causes of death.

The analysis of the mean age at death from external causes and from total causes of death highlights major discrepancies (Table 2). This indicates the relatively young age structure for deaths from external causes compared to overall mortality for both sexes. If for external causes of death are reported older ages, this two indicators will have appropriate values. Analysis in dynamic shows that both indicators increase, but more pronounced growth is attested for mean age at death from external causes. Even if discrepancies remain high, there was a reduction in the variations between the mean age at death from external causes and the mean age at death from all causes of death for both females and males with 3.5 and 3 years respectively. In addition, the age structure of mortality for males is younger than for females. Mean age at death due to external cause of death was 4 years lower for males compared to females in 2000 and the gap increase in 2014 and represent 5.8 years. The tempo of changing age structure of mortality due to external causes of death is different for males and females. For males mean age at death due to external causes increase with 5.5 years, while for females was registered a growth of 6.9 years.

Table 2
Mean age at death from external causes and all causes of death, by sex, 2000 and 2014 years

Year	Males			Females		
	External causes	Total	Difference	External causes	Total	Difference
2000	42.8	61.1	18.3	47.2	68.9	21.7
2014	48.3	63.6	15.3	54.1	72.3	18.2
Difference 2014-2000	5.5	2.5	-3.0	6.9	3.4	-3.5

Source: Author's calculations.

More detailed analyses of age structure of mortality due to external causes of death shows that situation does not change essentially through 2000-2014 period (Fig. 4). Compared to 2000, in 2014 a shift to the right of the maximum contribution group from 20-24 years to the previous age group was observed. Thus, over 80% of the total deaths for the 15-19 age group are due to external causes of death. Also, an increase in the share of deaths from external causes is recorded in the age groups 20-24 and 25-29 years. No changes were observed in the 35+ years mortality pattern. In the case of women, the flat recorded for the age group 5-19 years in 2000 is replaced by an obvious increase for the 10-14 age group in 2014. Similarly, in the 2014 compared to 2000, the proportion of deaths due to external causes of death increases in the 15-19 age group. For the subsequent age groups there were no significant changes. Reducing the share of deaths by external causes after reaching the maximum in the 15-24 age group is explained by an increase in the number of deaths due to other causes of death and not by real reducing of number of deaths from external causes.



Figure 4. Share of deaths due to external causes from all deaths by age and sex, for years 2000, 2014, %

Source: Author's calculations.

In the case of males, the main five subgroups of external causes are suicide and self-inflicted injuries; other accidents and late effects of accidents; transport accidents; other accidental breathing threats; accidental poisoning with other substances. For females, there are other causes: other accidents and late effects of accidents, other accidental breathing threats, suicide and self-inflicted injuries, transport accidents, attacks.

Table 3

Standardized mortality rates by different external causes of death for Republic of Moldova, 2014

	SDR		Share from total external cause, %	
	Male	Female	Male	Female
Transport accidents	232	50	13.2	11.0
Accidental falls	134	26	5.9	5.1
Accidental drowning and submersion	107	32	5.8	7.0
Accidental exposure to smoke, fire and flames	81	27	3.3	5.3
Accidental poisoning by alcohol	110	29	5.7	6.4
Accidental poisoning by other substance	158	61	6.8	11.3
Other accidental threats to breathing	182	30	8.9	6.7
Suicide and self-inflicted injury	412	59	20.8	12.9
Assault	113	37	5.5	8.2
Event of undetermined intent	138	28	7.2	5.9
Complications of medical and surgical care	2	0	0.0	0.0
Other accidents and late effects of accidents (reminder)	346	98	16.9	20.1
Total	2013	478	100	100

Source: The Human Cause-of-Death Database.

Discrepancies between males and females remain at the same level in the structure of external causes of death. Thus, males mortality for different subgroups from external causes of death is four times higher than for females. Because of the desynchronization in the structure of deaths from external causes noted for males and females, structural differences are attested. Both the differences in the level and structure of mortality from external causes are defined by behavioural particularities and specifics of activities for both sexes.

For males, the most important cause of death in mortality from external causes of death is suicide and self-inflicted injuries. This is responsible for about 20% of all deaths due to external causes of death, for females, this represent only 12.3% of deaths. The gender gap in level of suicide is analysed in many other studies. One of the main factor is the difference in coping with stressful situations and the closeness to social networks. Females are more closely involved in social networks and have a complex approach to solving depressed situations. Thus, there are certain "protective factors", which subsequently determine the

discrepancies in the acceptance and application of suicidal behaviours. In addition, the alcohol abuse is an important cause in driving to suicidal behaviour, which also represent a higher risk for males.

Another cause of death that is crucial for both sexes is other accidents and late effects of accidents. In the case of males, this is slightly over 17% and for females slightly over 20% of total deaths from external causes. We assume that the mortality caused by late effects of accidents is caused by low quality of emergency medicine, as well as by the poor rehabilitation conditions in the post-accident period.

The third most important cause for males is transport accidents, while for females this is the fourth. Males are more likely to be exposed to the risk of death caused by transport accidents due to the predominance of males in road traffic but also by professional and recreational activities. For males, deaths from transport accidents account for 11.5% and for females 10.5% respectively.

In case of accidental poisoning with alcohol, the sex ratio is 2.4, therefore mortality is 2.4 time higher for male than for female. Despite that this is not one of the main causes of external causes of death, it is a major problem. On the one hand, this subgroup is a very narrow, formed by only one cause of death. On the other hand, this cause of death has a direct link to the lifestyle or the risk behaviour and mortality. Mortality from accidental poisoning with alcohol is a consequence of excessive alcohol consumption.

Conclusions

During 2000-2014 period, a mortality stagnation from external causes of death for both sexes is observed and the gender gap was maintained at the same level. Mortality analysis by external causes of death through its contribution to the differences in life expectancy at birth for 2000 and 2014 years has shown a reduction in deaths with a greater impact on males than females. Sex differences are not limited to mortality alone but also to its causal structure.

Reducing the intensity of mortality from external causes is a major challenge for authorities due to the complexity of policy implementation actions, as well as the significant costs needed for implementation. Actions to reduce the intensity of mortality from external causes are long-term prospects and their results are visible in the years after the implementation. The lower resources for decreasing mortality from external causes are allocated, more funds for continuation of this process will be needed. The decrease in the number of traffic accidents will be possible due to considerable investments in the road infrastructure, but also the introduction of new standards of the traffic code, which meets the standardization requirements of the EU Member States.

The late effects of accidents could make a lower contribution to mortality due to modernization of medical equipment, proper medical training, and the development of emergency medicine infrastructure. In case of accidental poisoning by alcohol, the importance of legislative regulations on the preservation and marketing of alcohol (including illicit or unsafe products), and the standardization of the quality of alcohol products.

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