Problems with Mortality Data in Russia

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Abstract
Mortality crisis in Russia was discussed many times in the scientific literature. However little attention was paid to the problems of the quality of mortality statistics in Russia, which is rapidly deteriorating. During the first half of 1990s mortality from such cause as "injuries undetermined whether accidentally or purposely inflicted" grew with particularly rapid pace. In this study we tested a hypothesis that mortality from violent causes of death (particularly in middle-aged men from marginal social groups) is concealed using death codes from the class "Symptoms, signs and ill-defined conditions" (ICD-9). Reported mortality from this group of causes increased 6-fold for males and 9-fold for females in 1989-2002. This hypothesis of concealing criminal cases of violent deaths under the mask of ill-defined conditions was confirmed using case study of death certificates from the Kirov region of Russia. It is likely that mortality from violent causes in Russia is significantly underestimated by the official statistics.

Introduction

The dramatic social, political and economic changes that happened in Russia during the transition period are well documented. The first immediate effect of these changes on the life of ordinary people was significant loss of real savings and salaries because of more than 1000-time increase of retail prices during the first year of reforms, leading to rapid impoverishment of a significant part of population. As a result, most people had to change their profession, job or mode of life. These changes had serious impact on social, economic and political processes leading to social disorganization, disadaptation, and loss of social capital. They also had impact on the functioning of state systems, agencies and services including the system of state vital statistics.

In 1992 and 1998 Russia experienced two serious economic crises accompanied with drop in personal income and rapid impoverishment. In both cases, adverse economic changes were followed by mortality increase. From 1992 to 1994 life expectancy of Russian males dropped from 63.8 to 57.7 years. Female life expectancy dropped from 74.4 years to 71.2 years. This decrease in life expectancy coincided in time with the introduction of painful economic experiments ('reforms') in Russia, leading to a rapid decrease in real wages and pensions, nearly complete loss of personal savings, and a tremendous increase in the poverty rate. The main causes of death that contributed to this mortality decline were diseases of the circulatory system, accidents, poisoning and injuries, diseases of the respiratory system. After 1995

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mortality in Russia demonstrated slow but stable decrease indicating partial recovery. However, in August 1998 Russia experienced another economic crisis (crash of the banking system) resulting in mass impoverishment. Shortly after this crisis mortality started to grow again and male life expectancy dropped from 61.0 in 1998 to 59.7 years in 1999, while female life expectancy dropped from 72.6 to 71.9 years. In both cases population at working ages appeared to be the most vulnerable age group while children and the elderly were not significantly affected (Notzon et al., 1998).

These decreases in life expectancy are beyond the peacetime experience of any industrialized country. Current life expectancy in Russia is lower than in China and even less than in some countries of Africa (see Table 1).

Table 1 About Here

This phenomenon received significant attention in a number of papers (Ellman, 1994; Gavrilova et al., 1997; Notzon et al., 1998; Leon et al., 1997; Shkolnikov et al., 1996a; 1996b; 1998; Tulchinsky, Varavikova, 1997; Walberg et al., 1998), which showed that diseases of the circulatory system, injuries, and diseases of the respiratory system were the major causes of death contributing to the decrease in life expectancy in Russia after 1991.

Although previous studies provided an important information on the magnitude of mortality changes and on major causes of the decrease in life expectancy, little attention was paid to the causes of death with the highest rate of growth – "other," "unspecified" or "ill-defined" causes of death. It would be a big mistake to consider this growth as a consequence of increased accuracy of diagnostics. Most likely this phenomenon is an indicator of decline in the level of diagnostics and deterioration of data quality (Gavrilova et al., 2000; Ivanova et al., 2002; Semyonova et al., 2004a). We believe that the problem of data quality must be given the highest priority in Russian vital statistics and the purpose of this paper is to analyze the scale and patterns of this problem.

As indicators of data quality we propose to use mortality from the following causes of death: (1) mortality from causes comprising the chapter "Symptoms, signs and ill-defined conditions" according to ICD-9 or "Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified" according to ICD-10, and (2) mortality from causes comprising the section Y10-Y34 ("Event of undetermined intent") of ICD-10 as an additional indicator. The last cause of death is included into group of external mortality.

Previous Studies of Data Quality in Russian Vital Statistics

The rapid and sharp changes in mortality experienced by Russia in recent decades have generated some concerns about the quality of Russian vital statistics (Anderson, Silver, 1997). Most of authors who worked with Russian mortality data admitted that recent mortality

fluctuations in Russia are not artifactual and that population estimates and death counts are accurate enough to ensure correct statistical analyses (Notzon et al., 1998; Leon et al., 1997; Bennett et al., 1998; Andreev, 1999). Wasserman and Varnik (1998) conducted a study of the reliability of statistics on violent death and suicide in the republics of the former USSR. They concluded that mortality data were reliable for Russia, Ukraine, and Belarus at that time period. The completeness of death reporting in Russia is rather high except for the North Caucasus Republics and the Republic of Tuva (Andreev, 1999). However, the quality of cause-of-death coding is not always good (Notzon et al., 1998; Andreev, 1999), and the last audit of the accuracy in reporting causes of death was conducted in Russia only in 1982 (see Shkolnikov et al., 1996a; Shkolnikov et al., 1997). The autopsies were performed on 33.2 per cent of all deaths in 1996 (Andreev, 1999).

Registration of deaths from violent causes raises particular concerns (Gavrilova et al., 2000; 2005). The main concern here is the increase in mortality from "injuries undetermined whether accidentally or purposely inflicted" (Russian code 175, new code 251 and ICD-9 codes E980-E989) or "injuries of undetermined intent" in ICD-10 (WHO, 1992). Some researchers believe that this code could be used to conceal some cases of homicide and suicide in order to avoid criminal investigation (Wasserman, Varnik, 1998; Pridemore, 2003). Male mortality from this cause increased dramatically after 1992 reaching its maximum in 1994. In previous research, we found that in Moscow, with its relatively high proportion of unregistered migrants, homeless, and refugees, the "undetermined injuries" for males exceeded any other cause of external mortality in 1994 (Gavrilova et al., 2000; 2001). Thus, while the population estimates and death counts are reasonably accurate, the quality of death coding is less satisfactory. This deficiency can bias the estimates of violent mortality and lead to mortality underestimation for some causes of death (especially for homicide and suicide deaths which may be reassigned to "undetermined injuries"). Some reports show that regional ZAGS agencies (local agencies of death registration) underreport homicide deaths compared to initial forensic medical records (Porodenko, Chernobai, 1999). Homicide victimization rates measured by vital statistics show approximately 20 percent higher rates compared to the data of police reports (Pridemore, 2003). Reports appearing in mass-media indicate that in some cases homicide deaths of homeless persons are reported as deaths from natural causes, deaths from undetermined injuries or deaths from accidental falls, and this situation is particularly common for large cities like Moscow (Gavrilova et al., 2005).

Another problem of the Russian mortality statistics is the increase in the proportion of deaths with undefined (not stated) ages during the transition period. Although the contribution of such deaths is not substantial for total mortality (0.25% in 1991 and 1.19% in 1994 for males), it is much higher for mortality from violent deaths (0.73% in 1991 and 2.59% in 1994 for males). The latter fact can affect the proper estimation of demographic indicators dependent on age distribution.

Despite the problems listed above, most researchers studying mortality in Russia believe that the quality of Russian vital statistics is good enough for mortality studies (Leon et al., 1997; Notzon et al., 1998; Wasserman, Varnik, 1998; Andreev, 1999). One of the arguments supporting the acceptable quality of Russian statistics is temporal stability of cancer mortality in 1992-95 against the background of a dramatic increase in total mortality (Leon et al., 1997).

Also, the standard rules of cause-of-death coding in the whole country ensure comparability of regional cause-specific mortality statistics. We believe that these overly optimistic estimates of Russian vital statistics quality should be revised in view of recent observations that during the last 15 years the quality of Russian mortality statistics significantly deteriorated as will be shown in this paper.

What is concealed behind the "ill-defined conditions"?

In the 1990s in Russia, male mortality from ill-defined conditions increased 5.9 times and female mortality increased 8.3 times while during the same period of time total mortality increased by 25.2 and 15.6 percent correspondingly, mortality from cardiovascular diseases by 21.3 and 10.5 percent and mortality from external causes of death by 64.2 and 54.8 percent. This growth resulted in substantial changes of mortality structure (Table 2): the proportion of ill-defined conditions increased from 0.8 to 4.0 percent in males and from 0.8 to 5.5 percent in females; the rank of this cause of death changed from the 9-10th place in 1989 to the 5-4th in 2000 so that ill-defined conditions became among the top priority problems of Russian public health.

Table 2 About Here

What is the reason of such unprecedented (even for Russia) growth of mortality from unknown causes? Indeed, according to the ICD-10 "this chapter includes symptoms, signs, abnormal results of clinical or other investigative procedures, and ill-defined conditions regarding which no diagnosis classifiable elsewhere is recorded" (WHO, 1992). There is an opinion that ill-defined conditions may mask part of mortality from cardiovascular diseases at older ages, because the current classification includes "senility" (R54). It is true that the growth of mortality of older people from ill-defined conditions during the 1990s was shocking – 7.9 times for males and 11.1 times for females. Two questions follow from this observation: first, if this growth was due to cardiovascular mortality, then what is the real level of cardiovascular mortality in Russia; second, is mortality from ill-defined conditions determined by cardiovascular rather than other causes of death?

To answer these questions, we studied mortality at young adult ages when "senility" may not be considered as a possible diagnosis. It turned out that mortality of infants from this cause of death increased two-fold in the 1990s (1.9 times for boys and 2.1 times for girls) while total infant mortality decreased by 13.8 and 10.4 percent correspondingly; mortality of children at ages 1-14 increased 2.5 times and 2.4 times (while total mortality decreased by 10.8 and 5.9 percent); mortality of adolescents aged 15-19 years increased 4.3 and 2.6 times (while total mortality increased by 38 and 24.4 percent). Mortality of working age Russian population from ill-defined conditions increased 4.6 and 4 times while total mortality of Russian population aged 20-59 years increased by 59.7 and 43.4 percent (see Table 3). Thus, mortality from ill-defined conditions increased several times in all age groups of Russian population and the pace of increase for this cause of death was higher than that of total mortality for corresponding age

groups. This observation suggests that ill-defined conditions mask not only cardiovascular mortality, but rather mortality from other causes of death.

Table 3 About Here

We hypothesize that in the 1990s in Russia many cases of external and violent deaths were concealed under the mask of ill-defined conditions. This suggestion is supported by the composition of causes comprising the section R95-R99, "Ill-defined and unknown causes of mortality," (such as "Instantaneous death," "Unattended death," "Unknown cause of mortality"). In the realities of Russia in the 1990s, these causes of death remind us first of violent causes of death particularly at young and working ages, when mortality is determined by external deaths. Interestingly, for young males of 15-19 years of age, mortality from ill-defined conditions in 2000 occupied the second position and this cause of death occupied the 4th place for mortality of 15-19 years old females (Table 4).

Table 4 About Here

We conducted a study of death certificates from the Kirov oblast (a typical region of Russia) in order to understand what specific causes are hidden under the name of "symptoms, signs and ill-defined conditions." We found that overwhelming majority of cases that fall into this group of causes of death are represented by decomposed bodies found in various places (Table 5).

Table 5 About Here

Although part of these deaths might be explained by sudden cardiac deaths, other cases raise concerns about the coding of these cases. It is more likely that the majority of deaths from ill-defined conditions (particularly at working ages) represent violent causes of death. It should be noted that Kirov region has rather low mortality from ill-defined conditions compared to other Russian regions. This problem with mortality statistics raises questions about the real levels of violent mortality in Russia and homicide mortality in particular.

Ill-defined conditions and external deaths of undetermined intent
as two sides of the same coin

The problem of data quality becomes even more explicit when we analyze the external mortality. Our analysis of external mortality showed that the levels of Russian homicide mortality which are already 30 times higher than in the European Union could still be underestimated, particularly for males. The group of external mortality in ICD-10 contains a section Y10-Y34, "Event of undetermined intent." According to ICD-10, "this section covers events where available information is insufficient to enable a medical or legal authority to make a distinction between accident, self-harm and assault. It includes self-inflicted injuries, but not

poisoning, when not specified whether accidental or with intent to harm" (WHO, 1992). It is worth to note that injuries of undetermined intent occupied in 2000 the second position among the external causes of death for males (after suicide). During the 1990s, mortality from injuries of undetermined intent increased 2.9 times for males and 2.5 times for females on the background of 64.2 and 54.8 percent growth of external mortality. In 2000 this cause of death was responsible for 13.2 percent of male external mortality and 12.5 percent of external female mortality.

What real causes of death are hidden behind the injuries of undetermined intent – homicides, suicides or accidents? The answer to this question may be partially given by the analysis of regional mortality. During the 1990s two regions had the highest levels of mortality from injuries of undetermined intent: Voronezh oblast and Moscow city. For example, mortality of Voronezh males from ill-defined conditions exceeded the country level 8.9 times and mortality of Voronezh females 5.1 times (Semyonova et al., 2004a). At the same time, Voronezh oblast had the lowest level of homicide mortality in Russia. The level of homicide mortality in Voronezh oblast was so low that it was even below the rate of murders reported by police crime statistics while in the rest of Russian regions the situation was quite opposite (Pridemore, 2003).

Moscow city in the 1990s, occupied one of the leading positions according to the level of mortality from injuries of undetermined intent. Moreover this cause of death was among the top causes of death of external mortality for Moscow city. However this situation has changed over one single 2000 year! In 2000 mortality from injuries of undetermined intent suddenly decreased 2.3 times both for males and females and Russian capital no longer was among the leaders of this kind of mortality. More detailed analysis of this unbelievable success in "data quality improvement" showed that during the same year (2000) mortality structure of Moscow population was subjected to radical changes and the notorious ill-defined conditions moved over one year from 12-13th to the 6th position. Mortality from ill-defined conditions of children and the elderly was subjected to minimal changes while mortality of 1-14 aged boys and 15-19 aged girls moved from the 13th to 5th and from the 17th to the second position correspondingly. These striking changes in mortality during 1999-2000 resulted in 8-fold increase of male mortality from ill-defined conditions and 6-fold increase of female mortality from the same cause of death. According to traditional opinion, mortality from injuries of undetermined intent should reflect the quality of medical examiner system on the particular territory. Using these considerations, one may conclude that in the 1990s the least qualified specialists were concentrated predominantly in the capital of Russia, which does not agree with the common sense. As a result of all these manipulations with statistics, external mortality in Moscow declined from 1999 to 2000 by 28.6 percent for young (aged 20-39) males and by 31.8 percent for young females. The benefit of these changes seems dubious. Before 1999 the Moscow Department of health care had at least some understanding of real number of external deaths in Moscow city for planning purposes. After 2000 this understanding was lost.

Moscow city demonstrates a peculiar mortality pattern not only for ill-defined conditions but also for some other causes of external mortality. Although the two largest cities in Russia, Moscow and St. Petersburg, have age-adjusted homicide rates (per 100,000 population) much lower than Russia as a whole (17.11, 20.21 and 30.35 respectively), these rates seems to be

significantly underestimated. For example, Moscow oblast and Leningrad oblast – regions surrounding Moscow city and St. Petersburg respectively – have homicide mortality levels, which exceed country level: 37.57 and 36.63. Thus, the quality of male homicide statistics in Moscow raises serious concerns. The structure of mortality from external causes in Moscow demonstrates very unusual pattern, quite different from other regions of Russia. For example, in 2001, the most common causes of male external deaths in Moscow were injuries of undetermined intent and accidental falls. In the same year in Russia, the most common cause of external mortality for males was suicide, while mortality from accidental falls occupied only the 9th position (see Table 6) and the majority of accidental falls occurred in working ages.

Table 6 About Here

We already noted that injuries of undetermined intent may be used for concealing homicide cases. In Western countries deaths from accidental falls are observed predominantly among the oldest age groups (over 80) and very high proportion of deaths from accidental falls among middle aged men in Moscow looks suspicious. All these facts suggest that homicide rate for males in Moscow may be far higher than it is reported by the official statistics.

Analysis of mortality structure of already mentioned Voronezh oblast creates an impression that this region has no reliable medical examiner system. Starting from 1993, the triad of three major groups of causes of death in this region looks like "cardiovascular diseases – ill-defined conditions – malignant neoplasms" rather than typical and observed in other developed countries triad of "cardiovascular diseases – malignant neoplasms – accidents, injuries and poisoning."

Such a peculiar situation hardly is determined only by medical factors. We need to consider the overall socio-economic situation in Russia. Job positions of medical examiners were filled by 30 percent only in 2000 with poor equipment and supplies. In addition to that, low-paid medical examiners hardly may be considered as independent and objective persons and their decisions may be subjected to external influence from relatives or police officers.

Social patterns of mortality in Kirov region

Problems with mortality statistics in Russia is a reflection of socio-economic problems existing in Russian society. Growth of crime, violence, poverty, income inequality, alcohol and drug abuse resulted in marginalization of significant part of Russian population. These disadapted people are of little interest to health, police or other state services, which consider such persons as "disposable" with no intention of careful investigation of their deaths. However detailed studies of social factors of mortality are particularly difficult now in Russia: starting from 1999, Goskomstat of Russia (Russian office of statistics) no longer collects information about social status, education, place of residence and marital status of deceased (based on the law adopted by the State Duma).

The logic of our study requires more detailed study of social characteristics of persons died from external deaths and ill-defined conditions. Because no official data on this issue exists now, we used a sample of deceased in Kirov region in 2004 where social characteristics of deceased persons were available. All deceased persons died at young working ages (16-39 years) and their social status was presented by eight occupation groups: military (including police and security), blue-collar workers, unemployed, prison inmates, high school students, university/college students, businessmen, white-collar workers. The results of our study are presented in Tables 7-8.

Table 7 About Here

Table 8 About Here

During the period of our study 632 persons aged 16-39 years (507 males and 125 females) died in Kirov region. These results demonstrate that 90 percent of deaths at young working ages is determined by unemployed and blue-collar workers. Another interesting observation is that non-external deaths are almost entirely observed among socially disadapted groups (unemployed and blue-collar workers) with particularly high levels of cardiovascular deaths. Our data support the idea that mortality from injuries of undetermined intent are predominantly observed in socially disadapted groups of population and substantial part of these deaths most likely conceal cases of homicide.

Conclusions

Mortality in Russia is extremely high given the socio-economic potential of this country. Mortality at working ages continues to grow. In addition to this, the quality of mortality statistics is deteriorating. Period of reforms, starting in the mid 1980s, resulted in qualitative changes in the pattern of Russian mortality. These changes may be summarized as marginalization of Russian mortality. The main characteristics of it are:

1. Degradation of cause of death structure
2. Misrepresentation of real mortality pattern
3. Formation of specific social portrait of deceased in the age groups of maximal risk (young and middle working ages)

Ongoing degradation of the quality of mortality statistics was shown in this paper using the group of causes named "ill-defined conditions," which demonstrated a rapid growth in reported cases over the last ten years. Similar pattern is observed for the injuries of undetermined intent. Proportion of deaths from these two causes is the highest at working ages and there is a good reason to believe that many such causes conceal criminal cases of violent death.

More detailed study of social status of deceased (a case study in Kirov region) shows significant social differentiation of mortality. These findings require more detailed analysis, which we hope to conduct in the future.

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Table 1. Life Expectancy at Birth in Russia and Other Countries

Country	Year	Life expectancy at birth	
		Males	Females
Russia	1991	63.5	74.3
	1992	62.0	73.8
	1993	58.9	71.9
	1994	**57.6**	**71.2**
	1995	58.3	71.7
	1996	59.8	72.5
	1997	60.8	72.9
	2000	58.8	71.7
India	1994-1997	62.4	63.4
China	1994-1997	69.0	73.0
Tunisia	1994-1997	69.5	73.3
United States	1997	73.6	79.4

Source: Russian official statistics (Goskomstat); World Health Organization; National Center of Health Statistics.

Table 2.

Age-adjusted death rates of Russian population from major groups of causes of death in 1989 and 2000

Cause of death	Males		Females	
	1989	2000	1989	2000
All causes	1660.1	2075.5	883.1	1020.6
Infectious and parasitic diseases	23.2	44.2	6.2	8.5
Neoplasms	319.0	289.2	142.9	138.9
Endocrine, nutritional and metabolic diseases	5.8	7.0	7.4	9.1
Diseases of the nervous system and sensory organs	8.8	12.4	6.0	6.6
Diseases of the circulatory system	861.9	1045.4	567.2	626.8
Diseases of the respiratory system	116.3	127.9	39.3	31.5
Diseases of the digestive system	43.8	62.0	21.3	28.6
Diseases of the genitourinary system	21.0	14.3	8.9	7.6
Congenital malformations	8.6	8.8	7.2	7.3
Certain conditions originating in the perinatal period	14.7	12.9	9.9	9.0
Symptoms, signs and abnormal clinical and laboratory findings	14.1	82.5	6.7	55.9
External causes of morbidity and mortality	217.1	356.4	53.8	83.3

Table 3. Temporal changes in death rates (per 100,000 population) from ill-defined conditions for different age groups of Russian population.

Age groups	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	Males											
<1 year	0.4	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.9 \	0.8
1-14	1.1	1	1.2	1.2	1.8	1.7	1.6	1.6	1.8	1.8	2.3	2.7
15-19	2.3	2.5	2.6	3.3	4.5	5.4	6.2	5.7	5.2	5.2	7.2	10
20-59	12.5	15	15.8	22.4	36.2	44.6	42.7	34.4	30.4	30.5	42.1	57.5
>60 years	38.4	128.3	191.2	236.1	303	333.3	316.8	319.4	310.2	288.9	290.2	302.1
	Females											
< 1 year	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7
1-14	0.8	0.8	0.9	0.8	1.2	1.1	1.4	1.3	1.3	1.4	1.7	1.9
15-19	1.4	1.1	1.8	1.8	1.7	1.9	2.5	2.2	2.2	2.9	3.2	3.6
20-59	3	3.4	3.7	4.8	8	9.7	9.4	7.5	7	6.6	9.1	12.1
>60 years	26.7	113.5	171.8	211	268	293.7	298.8	313.8	311.5	298.4	302.3	296.9

Table 4. Death rates (per 100,000 population) from major groups of causes of death for Russian population at age 15-19 years in 1989 and 2000.

Cause of death	Males		Females	
	1989	2000	1989	2000
All causes	156.3	215.7	65.5	81.5
Infectious and parasitic diseases	1.9	3.9	0.9	2.4
Neoplasms	9.2	8.3	7.0	6.3
Diseases of the nervous system and sensory organs	5.1	5.3	3.5	3.2
Diseases of the circulatory system	5.5	7.9	3.9	3.8
Diseases of the respiratory system	3.3	4.5	2.3	2.3
Diseases of the digestive system	1.6	2.1	1.0	1.2
Diseases of the genitourinary system	1.6	1.0	1.5	1.2
Congenital malformations	2.0	1.6	1.3	1.4
Symptoms, signs and abnormal clinical and laboratory findings	2.3	10.0	1.4	3.6
External causes of morbidity and mortality	121.2	167.2	37.6	52.6

Table 5. Distribution of deaths from ill-defined conditions in Kirov region of Russia in 2003

Age group:	<1 year	1-14	15-19	20-39	40-59	60+	total
Males							
Sudden infant death (R95)	10						10
Decomposition in water (river, well, pond) (R99)		1	2	15	21		39
Decomposition at home (R99)				11	82	68	161
Decomposition in garden, summer house (R99)					5		5
Decomposition in forest (R99)				3	5	4	12
Decomposition in field (R99)				2	2	2	6
Decomposition in nonresidential building (R99)				2	5	3	10
Decomposition on the street (R99)				5	20	2	27
Decomposition in water pipe (R99)					2		2
Decomposition on the cemetery (R99)					1		1
Decomposition in bath, lavatory or barn (R99)					2	1	3
Decomposition in other place (R99)			1	4	10	2	17
unknown (R99)					4	3	7
senility (R54)						1	1
Total	10	1	3	42	159	86	301
Females							
Sudden infant death (R95)	3						3
Decomposition in forest (R99)					3	3	6
Decomposition on the street (R99)					3	2	5
Decomposition at home (R99)				3	21	28	52
Decomposition in water (river, well, pond) (R99)					1		1
Decomposition in nonresidential building (R99)					1		1
Decomposition in vegetable storage pit (R99)					1		1
Decomposition in field (R99)						3	3
Decomposition in garden, summer home (R99)					3		3
Decomposition in other place (R99)				1		1	2
unknown (R99)					1	10	11
senility (R54)						11	11
Total	3			4	34	62	99

Table 6. Top Five Causes of External Mortality in Russia and Moscow

Russia	Moscow
Suicide	Accidental Falls
Injuries of Undetermined Intent	Injuries of Undetermined Intent
Homicide	All Other Accidental Causes
Accidental Poisoning by Alcohol	Homicide
All Other Accidental Causes	Suicide

Table 7. Distribution of males died at age 16-39 in Kirov region of Russia in 2004 according to the cause of death and social status of deceased

Cause of death	Military (including police, security and fire fighters)	Blue-collar workers (including drivers)	Unemployed (including handicapped and unknown persons)	Prison inmates	High school students	University and college students	businessmen	White collar workers	Total
Diseases of the circulatory system	1	18	43	1			2		65
Injury and poisoning	21	152	166	2	10	8	11	4	374
Ill-defined conditions		9	7					3	19
Neoplasms	1	3	7						11
Infectious and parasitic diseases		1	8						9
Diseases of the skin and subcutaneous tissue			1						1
Diseases of the genitourinary system		1	1						2
Diseases of the nervous system			2					1	3
Diseases of the respiratory system		1	5						6
Diseases of the digestive system		1	9				1		11
Mental and behavioural disorders			5						5
Endocrine, nutritional and metabolic diseases							1		1
Total	23	186	254	3	10	8	15	8	507

Table 8. Distribution of males died at age 16-39 in Kirov region of Russia in 2004 from injuries and poisoning according to the social status of deceased

Cause of death	Military (including police, security and fire fighters)	Blue-collar workers (including drivers)	Unemployed (including handicapped and unknown persons)	Prison inmates	High school students	University and college students	businessmen	White collar workers	Total
Instantaneous death (R96.0)			1						1
Other ill-defined and unspecified causes of mortality (R99)		9	6					3	18
Inhalation of foreign object			2						2
Inhalation of gastric contents		1	3						4
Exposure to excessive natural cold		3	5		1			1	10
Exposure to smoke, fire and flames		1	5				1		7
Exposure to unspecified factor	5	1	1					1	3
Traffic accidents		21	12		2	1	6		47
Victim of lightning		1							1
Exposure to electric current		3			1				4
Firearm discharge	1								1
Fall		2	1						3
Operations of war	1								1
Injuries of undetermined intent	1	12	17						30

Foreign object			1						1
Other accidental poisonings		3							3
Suicide	7	40	45	2	5	2	1	1	103
Accidental poisoning by alcohol	2	20	26						48
Homicide		21	25		1	2	1		50
Bites or hits		2	1						3
Drowning	4	21	22			3	2	1	53
Total	21	161	173	2	10	8	11	7	393