

Avoidable mortality in Lithuania

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Abstract

Study objective – The study aimed to analyse avoidable mortality in Lithuania as an index of the quality of health care and to assess trends in avoidable mortality from 1970–90.

Setting and participants – All deaths of Lithuanian residents aged between 0 and 64 years between 1970 and 1990 were analysed.

Measurements and main results – Twenty seven per cent of all deaths in this age group were avoidable. Avoidable deaths were grouped into preventable and treatable ones. Treatable causes of death accounted for 54%, and preventable, 46% of avoidable mortality. Time trends showed that general mortality and mortality from avoidable causes of death in this age group were almost stable between 1970 and 1990. Mortality from treatable causes of death fell, while deaths from preventable causes increased. The results in the preventable group were greatly affected by deaths from malignant neoplasms of trachea, bronchus, and lungs. Differences were noted between the sexes in total mortality as well as in avoidable mortality.

Conclusions – Avoidable causes of death are relatively common and, consequently, they are of practical importance for public health and studies of the health care quality in Lithuania. Reorganisation of health care is to be carried out and considerable emphasis will be placed on health education, promotion, and prevention, as primary prevention measures have not been effective thus far.

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Many European countries have been involved in developing a new approach to evaluating the health status of the population. The availability of national mortality data in Lithuania enables researchers to apply this approach in their scientific investigations.

The avoidable mortality method was proposed by an American working group chaired by Rutstein for measuring the quality of health care. The philosophy behind this method is that health services influence mortality from some diseases by prevention or treatment. The working group listed about 80 causes of death which, in some age groups, were defined as indicators of the outcome of medical care intervention or, for some health conditions, indicators of national health policies. High death rates from these causes should be a warning signal indicating that in depth studies of the quality of care are needed. A European Union working group has published atlases of regional differences in a number of “avoidable” deaths,^{1,2} and this method has been used in other studies.^{3–6}

The method of “avoidable” mortality applied

to the mortality data in Lithuania may be of interest for several reasons. Firstly, during the long Soviet presence detailed mortality statistics were used only for “duty” purposes and were not acceptable to researchers. Limited data appeared in Lithuanian statistical yearbooks and a few publications were issued in the former USSR. Secondly, studies of trends in death rates from different death causes and total mortality as an important part of the epidemiological monitoring of public health have not been developed here. Thirdly, most health status indicators probably reflect the country’s socioeconomic problems. Mortality from conditions amenable to medical intervention is believed to reflect, at least partly, the situation of the health services in Lithuania over the past decades of Soviet influence.

This study aimed to evaluate how well this method can be applied to mortality data in Lithuania and to assess trends in “avoidable” mortality over a 21 year period, from 1970.

Methods

National data on deaths in Lithuania were obtained from the Lithuanian State Department of Statistics in Vilnius. This department is the central statistical body in Lithuania. For the period of 1970–87 there are aggregated national mortality statistics, based upon the death certificates routinely issued by doctors after the death of every Lithuanian citizen. Since 1988, individual death certification data have been computerised. For the present study data for 1988–90 were derived from tapes supplied to the Lithuanian Health Information Center by the State Department of Statistics.

“Avoidable” causes of death were grouped according to the cause of a death – that is in ICD-9 chapters. The “avoidable” causes of death were also divided into those which were preventable and treatable according to the list published by Rutstein *et al.*⁷ We have selected 14 conditions which largely cover the Rutstein list.⁸

Crude and age standardised mortality rates for males and females were calculated on the basis of deaths and population data. Analysis was confined to the age group of 0–64 years. A direct adjustment for age was done using the European population as a standard. The rates are expressed as average annual rates per 100 000 population. Regression analysis was carried out using the year of death as an independent variable and the death rate as a dependent variable. Several different models of fit were tested including exponential, power, and logarithmic. Finally, because of simplicity of interpretation and relatively good fit, a linear model was selected. Quality of fit was tested by the coefficient of determination (r^2) and detailed examination of residuals. The significance of the average annual percentage change (AAPC) was tested using the Student’s two tailed t test.

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Table 1 Number of deaths from avoidable causes, age standardised death rate per 100 000 population (European standard), coefficient of determination, and average annual percentage change (AAPC) for the age group 0-64 in Lithuania, 1970-90, in relation to sex

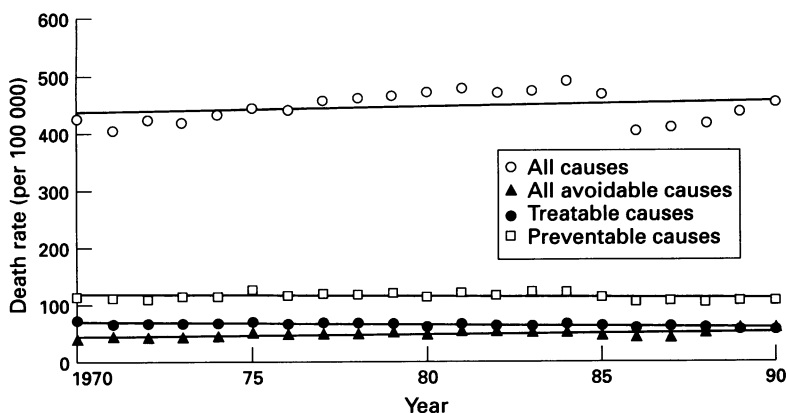
Causes of death	No of deaths	Age standardised death rate	Coefficient of determination r^2	AAPC (%)	p value
All causes of death:					
M	174 233	672.3	0.112	0.4	NS
F	85 086	269.9	0.099	-0.2	NS
Total	259 319	449.7	0.059	0.2	NS
All avoidable causes of death:					
M	45 901	173.6	0.029	0.2	NS
F	23 061	73.2	0.23	-0.4	*
Total	68 962	118.1	0	0	NS
All treatable causes of death:					
M	21 079	79	0.396	-0.7	**
F	17 790	56.8	0.609	-0.9	***
Total	38 869	66.8	0.527	-0.8	***
All preventable causes of death:					
M	24 822	94.6	0.337	0.9	**
F	5271	16.4	0.333	1.3	**
Total	30 093	51.3	0.389	1	**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; NS, no significance.

Table 2 The number of deaths and age standardised death rate per 100 000 population for the most common avoidable causes of death by sex, 1970-90

ICD-9 code	Cause of death	Age group (y)	Sex	No of deaths	Age standardised death rate
Treatable causes of death					
010-018, 137	Tuberculosis including late effects of tuberculosis	5-64	M	3418	14.9
			F	811	2.8
			T	4229	8.2
180	Malignant neoplasms of the cervix uteri	15-64	F	2158	9.2
393-398	Chronic rheumatic heart disease	5-44	M	858	4.7
			F	613	2.9
			T	1471	3.7
460-519	All respiratory diseases	1-14	M	481	6.2
			F	411	5.5
			T	892	5.9
493	Asthma	5-44	M	78	0.4
			F	118	0.6
			T	196	0.5
540-543	Appendicitis	5-64	M	141	0.6
			F	112	0.4
			T	253	0.5
550-553	Abdominal hernia	5-64	M	74	0.3
			F	104	0.4
			T	178	0.4
401-405, 430-438	Hypertensive and cerebrovascular diseases	35-64	M	8157	81.4
			F	6923	50.1
			T	15 080	63.9
574, 575.0, 575.1	Cholelithiasis and cholecystitis	5-64	M	129	0.6
			F	242	0.8
			T	371	0.7
630-676	Maternal deaths	All years	F	390	33.7
	Perinatal mortality	0-6 days	M	7755	13.1
		+	F	5918	10.5
		stillbirths	T	13 673	11.8
Preventable causes of death					
162	Malignant neoplasms of the trachea, bronchus, and lung	5-64	M	9362	45.6
			F	1229	4.4
			T	10 951	21.7
571.0-571.3, 571.5-571.6	Cirrhosis of liver	15-64	M	2278	12.7
			F	1153	4.9
			T	3431	8.1
E810-E825	Motor vehicle accidents	5-64	M	13 182	48.3
			F	2889	9.6
			T	16 071	27.2

T = total population



Standardised death rate per 100 000 population (European standard) for avoidable causes of death in Lithuania 1970-90.

Results

Between 1970 and 1990, 174 233 deaths occurred in the male population and 85 086 in the female population aged 0-64 years. The avoidable causes of death accounted for 26.6% of all causes of death in the age group studied (table 1). The proportions of avoidable deaths in relation to all deaths were 26.3% for males and 27.1% for females. Mortality in this age group was considerably higher for males than females (672.3 and 269.9 per 100 000 population, respectively). The same ratio was found for deaths that were regarded as avoidable (173.7 and 73.2 per 100 000 respectively). Treatable causes of death accounted for about 56.4% of all avoidable causes, and preventable causes 43.6%. With regard to avoidable mortality, motor vehicle accidents accounted for the largest proportion - 23.3% (28.7% for males and 12.5% for females) (table 2). The second most common category in this group comprised hypertensive and cerebrovascular diseases (21.9%: 17.8% for males and 30.0% for females). Perinatal mortality accounted for 20% and malignant neoplasms of trachea, bronchus, and lung for 15.9%. Hypertensive and cerebrovascular diseases were the most common treatable causes of death in both sexes (81.4 and 50.1 per 100 000 for males and females, respectively). The other most common treatable causes of death were tuberculosis and respiratory diseases in men (14.9 and 6.2 per 100 000 respectively) and malignant neoplasms of cervix uteri and diseases of respiratory system in women (9.2 and 5.5 per 100 000 respectively). Large differences were noted between the sexes in selected avoidable causes of death. Mortality from tuberculosis in males was 14.9% and in females 2.8%; malignant neoplasm of trachea, bronchus, and lung accounted for 45.6% and 4.4% respectively; and deaths from motor vehicle accidents comprised 48.3% and 9.6% respectively.

The time trend analysis showed that in Lithuania total mortality and mortality from avoidable causes were nearly stable during the period analysed in the present study (table 1, figure). Trends in mortality from treatable causes of death showed a fall (AAPC = -0.8, $p < 0.001$), while mortality from preventable causes of death rose (AAPC = 0.9, $p < 0.01$).

Differences in time trends between sexes were noted. The trend of male mortality from avoidable causes remained nearly stable over the past two decades while for women mortality from avoidable causes decreased by 0.4% annually.

The trends for different, selected avoidable causes of death were analysed. Because of a relatively small number in certain causes of death groups, statistical significance for annual trends were found only for hypertension and cerebrovascular diseases and lung cancer (AAPC = 1.2, $p < 0.001$, AAPC = 3.2, $p < 0.001$).

Discussion

THE FEASIBILITY OF USING MORTALITY STATISTICS

Mortality statistics usually serve as an important measure of public health. Among the key issues in interpreting mortality statistics is the quality of death certification. The general

Table 3 Crude death rates per 100 000 population for avoidable causes of death for 1980–84 in Lithuania, Germany, Denmark, Sweden, and the European Union (EU)

ICD-9 code	Cause of death	Age group (y)	Crude mortality				
			Lithuania	Germany	Denmark	Sweden	EU
<i>Treatable causes of death</i>							
010–018, 137	Tuberculosis including late effects of tuberculosis	5–64	6.35	1.15	0.48	0.5	1.08
180	Malignant neoplasms of cervix uteri	15–64	4.34	4.74	9.05	4.13	3.83
393–398	Chronic rheumatic heart disease	5–44	3.01	0.18	0.17	0.09	0.35
460–519	All respiratory diseases	1–14	4.72	1.7	1.3	0.8	1.98
493	Asthma	5–44	0.6	1.08	0.41	0.8	0.62
540–543	Appendicitis	5–64	0.45	0.19	0.15	0.08	0.14
550–553	Abdominal hernia	5–64	0.27	0.16	0.13	0.12	0.2
401–405, 430–438	Hypertensive and cerebrovascular diseases	35–64	65.58	38.09	33.02	28.19	41.48
574, 575.0, 575.1	Cholelithiasis and cholecystitis	5–64	0.5	0.44	0.26	0.31	0.35
630–676	Maternal deaths	All years	27.73	15.97	5.62	9.76	11.74
	Perinatal mortality	0–6 days	11.4	9.941	8.83	9.76	12.7
		+ stillbirths					
<i>Preventable causes of death</i>							
162	Malignant neoplasms of trachea, bronchus, and lung	5–64	19.36			11.72	
571.0–571.3, 571.5–571.6	Cirrhosis of liver	15–64	10.48			10.57	
E810–E825	Motor vehicle accidents	5–64	27.14			10.06	

assessment given to both the census data and vital registration data is relatively good.^{9,10} The validity of death certificates, however, may vary in different causes of death. Kalediene¹¹ compared death certificates with medical records in 25–64 year olds and found discrepancies in 13.2% of deaths. Cardiovascular and respiratory diseases were over-reported (12.7% and 7.5% respectively) and malignant neoplasm was under-reported (2.8%). On the basis of these findings, we need to remember the possibility of variation in death rates as a result of coding practices and the reliability of death certificates. This problem needs to be improved in Lithuania, but it is nevertheless reasonable to expect that unreliable death certificates explain only a small part of differences in death rates.

Another important methodological question concerning mortality trend analysis is the comparability of death certificates over time: there are difficulties when classification and coding rules are changed. This is most obvious when a new version of the *ICD* is introduced. In our study we used two versions of the *ICD* – *ICD* 8 and 9: the latest one was introduced in Lithuania in 1980. No change attributable to this has, however, been found in the results shown.

In this study 14 of the most common indicators that are considered amenable to intervention by the health services have been analysed. Hodgkin's disease, which is often used in the analyses of avoidable mortality, was not included in our study. The basic tabulation list of mortality available in Lithuania differs from that used in other countries, and because of this Hodgkin's disease could not be separated from malignant myeloma, lymphosarcoma, reticulosarcoma, and other malignant neoplasms of the lymphoid system. The development of a basic tabulation list similar to that used in the other countries is of great importance for epidemiological surveillance in this country.

AVOIDABLE MORTALITY IN LITHUANIA

The results showed that 26.3% of deaths in males and 27.1% in females aged 0–64 years

are avoidable. Hence, they were relatively common, and for this reason were of practical importance to public health and studies on the quality of care.

However, this information is not sufficient as a basis for statements about quality of care in Lithuania. According to Donabedian,^{12,13} the quality of care should be related to different components of health care. These components are as follows: the structure, the process, and the outcome of care. The structure may refer to the organisation and the resources of health care, the process to the activities of giving and receiving care, and the outcome to the effects of care on the health status of the individual and the population. Studies of the link between different components of care are of importance in validating the assessment of the quality of care.¹³

The use of the concept of avoidable mortality as an outcome indicator has been criticised.^{16,17} The avoidable mortality method is, however, easily available, not expensive, and quick to use. Its application to data in Lithuania is of great value at present as the Lithuanian health care system is in transition. Avoidable mortality could be one of the starting points for assessment of the previous health care system. From this point of view the results of the analyses make more sense, even if they are compared with those of the other countries. Our health care system, like any other system in so-called "socialist countries", was centralised, hospital based, and poorly managed. The resources available for health care were extremely limited (between 3% and 4% of the gross national product), and were becoming even more limited because of the critical economic situation. At the same time, the indicators of medical care were much higher than those in the developed countries (39 doctors and 122 beds per 10 000 population).¹⁹ Two studies of avoidable mortality in eastern European countries have been published recently,^{5,6} and it was found that in the age group 0–64 years, mortality from treatable causes fell less quickly here than in developed countries, particularly after 1970.⁶ Our results also showed that mortality from these causes fell very slowly.

Since the avoidable mortality method is influenced by socioeconomic factors,^{16,18} comparisons with western countries are complicated because of large economic differences. This is of great importance as the Lithuanian health care system is moving more and more towards the model of developed (especially Nordic) countries. Comparisons based on already published data (only crude rates and standardised mortality ratios were published,²¹ and for comparison we selected the crude rates within the same time period and age grouping) did not show an encouraging pattern in Lithuania (table 3). For tuberculosis the Lithuanian death rate was between four and 12 times higher than in developed countries, for respiratory diseases it was between two and five times higher, and for hypertensive and cerebrovascular diseases it was twice as high. The low levels of mortality from treatable conditions presently seen in industrialised countries are likely to reflect, at least partly, the increased effectiveness of the health services.¹⁶ This shows, indirectly, the ineffectiveness and low level of health quality of the previous health care system. In this respect detailed comparisons would be of great benefit in investigating whether the public health or health care system has failed. In implementing health care reform, however, we have to remember that variations in mortality could result from differences in incidence or case fatality, in certification or in coding practices. Differences in the structure of health care, in its resources as well as in diagnostics and treatment, should be taken into consideration. In analysing certain groups of diseases, it is reasonable to discuss critical mortality rates which indicate that medical care is failing. The avoidable mortality method could be used for screening totals and thus could serve as a warning sign that further in depth studies are needed.²⁰

While analysing selected causes of death it was disconcerting to find that mortality from hypertensive and cerebrovascular diseases was increasing. In this connection, cardiologists from Kaunas, collaborating in some international projects (Kaunas-Rotterdam study, CINDI, MONICA project etc) have tried to implement a number of primary prevention measures in relation to these diseases. This has occurred on the local level, that is in Kaunas city and so-called "experimental" regions. It would be of great use if this activity could be extended to cover the whole country.

Death from malignant neoplasms of the trachea, bronchus, and lung influenced the results of the preventable group greatly. The increasing trend in lung cancer mortality, especially for men (AAPC=3.2, $p<0.001$) was expected. This type of trend was predicted in 1987 by Gurevičius.¹⁴ In Lithuania, during recent decades, there have not been any new laws or publicity campaigns against smoking and no programmes have been launched to monitor smoking habits in the population as a whole. Some surveys of selected groups have shed light

on the prevalence of smoking in Lithuania. The 1989 survey on the health behaviour of adults indicated that 72% of men and 15% of women were daily or occasionally smokers.¹⁵ Furthermore, the cigarettes used in our country contain much more nicotine and tar than those made in the west. The political and economic changes in Lithuania over the past few years have given us a chance to consider new legislation against smoking. The reorganisation of the Lithuanian health care system has to be carried out with the greatest emphasis placed on health education, promotion, and prevention, however, as our results show that primary prevention measures are still not working in Lithuania.

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