Excess winter mortality in Novi Sad, Serbia: evidence from urban population in temperate climate[1]

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Extended abstract

Introduction and methods

Seasonal oscilation in mortality are recognized many years ago and most regions experienced increase in mortality during the cold period with excess winter mortality betwen 5% and 30% (Kendrovski 2006; Healy 2003).

Winter death are known health and social challenge for many countries (Fowler et al. 2014). Recent research suggested that some winter excess may be avoidable. In temperate climates mortality is higher in winter than the other part of year (Ebi and Mills 2013; Davie el al. 2007; Helay 2003). Cities are marked as very vulnerable places were extrime hot and cold events lead to increase of daily death (Kinney et al. 2015) and induce seasonal patern of mortality. This paper explored trends in excess winter mortalityfor urban population in Novi Sad. Novi Sad is located in north part of Serbia and it is a second largest city in country (according to census 2011 in Novi Sad lives 231.798).

Analysis covered period from 1998/09 to 2012/13 for total mortality and cardiovascular (CVD) and respiratory mortality (International Classification of Diseases, version 10, codes 0-99, I00-I99, J00-J99).

Data was obtained from database of Statistical Office of Republic of Serbia and total number of death was agregated on monthly level with all month standardized to 30 days. Coefficient of seasonal variation of mortality (CSVM) was used to determinated excess winter mortalityand was calculated as difference between the four-month winter mortality and average mortality in preceding (Avgust-November) and following period (April-July).

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Results

Coefficient of seasonal variation of mortality during the observed period indicated that winter mortality was about 7% higher than mortality during preceding and following periods. Same results was found for CVD mortality (CSVM was 0.07). Table 1 shows recent trends in excess number of death for all cause of death and for CVD mortality. Only in three years winter mortality was lower compared with other period of year (preceding/following). More than 50% of causes of death are attributed to cardiovascular diseases and CVD mortality reveals identical seasonal pattern during the yearas total mortality, and it can conclude that winter CVD mortality affect excess winter mortality for all cuase. Respiratory diseases are not leading cause of death, but they have clear seasonal pattern with peak in winter. Respiratory mortality was about 40% higher in winter in regards to other part of year (CSVM for respiratory mortality = 0.4).

There was an influenza epidemic during the winter 1999/00 when the CSVM was about 0.27 (excess number of death was about 178). During the January and February 2000 population in Novi Sad was affected by strong influenza epidemic and it was one of the three stronges epidemics in period 1997-2007. According to Institut for Public Health of Vojvodina Province, Center for Disease Control and Prevention, most of recorded death in January and February 1999/00 were population aged 60 and over with some existing chronic diseases (respiratory or cardiovascular). In the winter 1999/00 cardiovascular and respiratory excess mortality contributed more than 70% to total number of excess death.

Table 1 Excess winter mortality in Novi Sad, 1998/99-2012/13

Winter	*Total*		*CVD*		*RD*	
	Total number of excess death	CSVM	Excess death	CSVM	Excess death	CSVM
1998/09	83	0.12	58	0.2	20	0.8
1999/00	178	0.27	90	0.3	46	1.6
2000/01	-11	-0.01	13	0.04	17	0.6
2001/02	17	0.02	-12	-0.03	7	0.2
2002/03	76	0.10	20	0.1	9	0.2

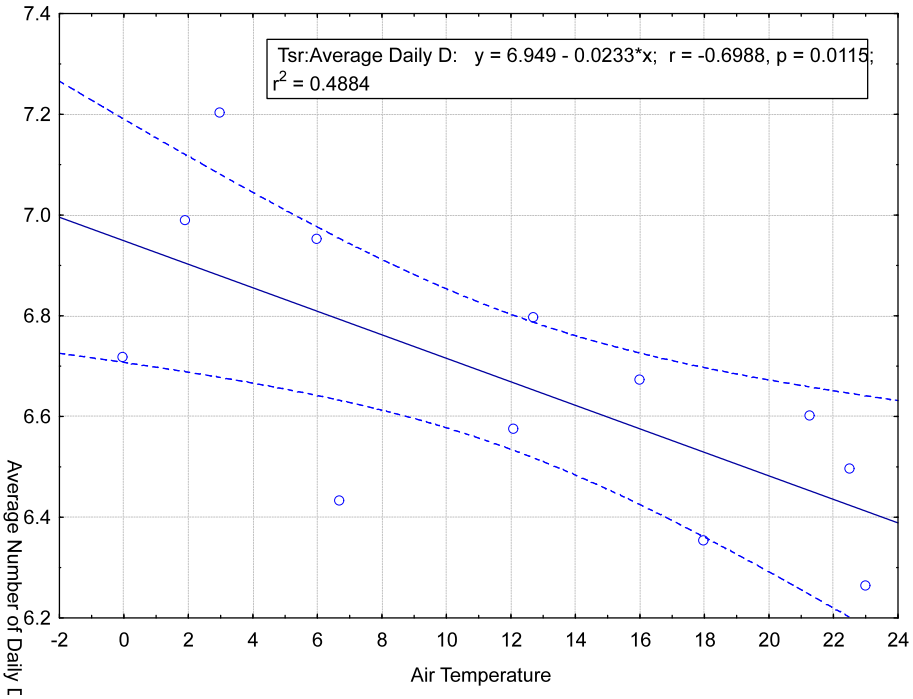
2003/04	81	0.10	47	0.1	-4	-0.1
2004/05	10	0.01	-2	-0.01	21	0.5
2005/06	-53	-0.06	-10	-0.02	13	0.4
2006/07	63	0.08	15	0.04	20	0.5
2007/08	68	0.09	32	0.1	2	0.05
2008/09	100	0.13	37	0.1	16	0.4
2009/10	46	0.05	-17	-0.04	15	0.4
2010/11	108	0.14	64	0.2	20	0.5
2011/12	112	0.14	41	0.1	6	0.2
2012/13	-18	-0.02	-29	-0.1	7	0.2

*CVD-cardiovacsular diseases (ICD 10, I00-I99); RD-respiratory diseases (ICD 10, J00-J99).

Findings in this paper and earlier results (Arsenović et al. 2014) excess winter mortality has decreasing trend since 50s. During the 50s and early 60s winter mortality was more than three times higher (1953/54-1963/64 CSVM=0.25). Similar course in winter mortality was found by Carson et al (2006) for London and Hajat etal (2007) for England and Wales. Still, there is debate why some regions, countries and cities experienced higher winter mortality. As contribution to this question, in this paper mortality was related with climate. For analysis was used average temperature taken from database of Republic Hydrometeorological Service of Serbia. Decreased of average temperature is followed with increase of average number of daily deaths

Declining vulnerability to temperature-related mortality and changing level of excess winter mortality in the period 1998/99-2012/13 as well as declining of CSVM since midlle of 20th century could not be explained only with temperature. Several other factors also play important role in this process: central heating (central heating in Novi Sad was lounched in 1961 when 491 apartment was included in sistem of heating. Today, about 80 percentage of homes have central heating, Census 2011) and lifestyle risk factors.

Graph 1 Relation between averagy daily number of death and air temperature, 1998-2013



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