

## Longevity in Siberia depends on place and month of birth

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There is increasing evidence that environmental factors of early life can determine a predisposition to and peculiarities of various chronic diseases. These effects should occur mostly in areas with the severe climate like in Siberia. In order to test a hypothesis that place of birth, i.e. conditions of prenatal and/or early postnatal development, can predict a longevity in this region I examined all death certificates for people who died in 1971–1978 in an industrial district (population 395 000 in 1979) of Novosibirsk city (south-western Siberia, Russia) due to the most common causes of death. Among them there were cardiovascular diseases (CVD, 1899 cases), pulmonary tuberculosis (259), chronic obstructive pulmonary disease (390), lung cancer (465), and stomach cancer (722). The regions of birth were categorised as western Siberia (Altai, Novosibirsk, Tomsk, Omsk, Kemerovo, Tyumen, Krasnoyarsk, Irkutsk regions) and western Russia (regions around Moscow).

Table. Age at death (year, mean±SD) in Novosibirsk city, Russia, 1971–1978, by sex, cause of death, and place of birth

Cause of death	Men		P*	Women		P*
	Place of birth			Place of birth		
	West Siberia	West Russia		West Siberia	West Russia	
Lung tuberculosis	47.8±12.2 (187)	53.5±13.3 (30)	0.042	58.6±12.5 (40)	73.5±9.2 (2)	0.084
Chronic obstructive pulmonary disease	61.2±10.8 (213)	66.0±11.1 (37)	0.009	64.9±13.7 (120)	71.9±8.7 (20)	0.029
Lung cancer	57.0±9.6 (322)	61.2±8.8 (48)	0.003	61.0±11.9 (84)	65.5±10.0 (11)	0.235
Stomach cancer	56.9±11.0 (296)	63.6±9.5 (63)	0.000	60.7±12.2 (316)	66.9±10.6 (47)	0.002
Acute myocardial infarction	55.4±13.2 (68)	58.6± 11.8 (14)	0.352	65.1±11.4 (62)	67.9± 3.7 (7)	0.921
Acute heart failure	53.3±12.0 (310)	58.9±11.0 (59)	0.002	61.9±11.7 (179)	64.9±10.5 (35)	0.161
Chronic ischemic heart disease	57.3±14.9 (783)	65.4±12.9 (167)	0.000	69.5±12.5 (780)	75.6±10.6 (156)	0.000
Stroke	67.8±12.1 (250)	71.7±10.0 (76)	0.018	71.8±9.7 (493)	75.1±8.7 (144)	0.000

Mann-Whitney test. Number of cases in parentheses.

As it is evident from the table, for both sexes and all diseases investigated except myocardial infarction, people who were born around 1910s in the western part of Russia lived longer. It seems highly likely that Siberian birth and/or childhood confers a susceptibility of adults to early death regardless of the cause.

These results raise a question whether the influence of birth region can be attributed to any effects of seasonally varying factors of early life. In further consideration, the age at death of men of Siberian origin was examined by analysis of variance (Kruskal-Wallis ANOVA) as a function of month or season of birth treated as independent variable. The analysis yielded an association between birth time during a year and lifespan for two causes of death. Thus, men born in October die from lung cancer 3.4 yr. younger than those born in March. The effect of month of birth is significant at p-value 0.01. People from the most numerous subgroup who died from CVD in March-April displays the opposite seasonal pattern: the age at death of decedents born in November was substantially greater than that for March-born men ( $65.8 \pm 12.5$  yr. versus  $46.5 \pm 13.1$  yr.,  $p < 0.0001$ ). Therefore, for these two causes, the earlier-than-normal deaths of men born in respective months seems to be not due to quicker ageing but to earlier onset of the given diseases and/or their quicker progressing.

Regarding the mechanisms underlying the relationships between place/season of birth and life span, at present we must be probably satisfied with stating the presence of the association observed in the severe Siberian climate and speculating on its possible causes. Among the possible explanations it is justified to emphasise the so-called early "imprinting" theory or the High Initial Damage Load hypothesis. However, it is worth evaluating the public health significance of these findings.