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Reassessing the Standard of Living in the Soviet Union: An Analysis Using Archival and Anthropometric Data

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Abstract: Both Western and Soviet estimates of GNP growth in the USSR indicate that GNP per capita grew in every decade – sometimes rapidly – in the postwar era, suggesting a rising standard of living throughout the period. This paper uses archival data and anthropometric studies conducted across the Soviet Union to reassess the standard of living in the USSR using alternative measures of well-being. Previously unpublished archival data on adult and infant mortality, as well as numerous studies of the heights of children, adolescents and adults are used to analyze health and living conditions across Russia's regions from 1955 to 1989. Overall, these data paint a picture of a society far behind other developed countries in the health status of its population in the early postwar era. For example, children born in the mid-1950s reached only the 10th to 25th percentile by height on U.S. growth charts, suggesting widespread stunting of children during that period. However, substantial and rapid improvements in child height and birth weight were recorded in subsequent years, so that by the late 1960s children reached roughly the 40th percentile of US child heights. A period of decline followed, marked by rising infant and adult mortality rates and by declining birth weights and child heights. It appears that the high GNP growth rates achieved in the Soviet Union in this period failed to translate into continuous improvements in well-being for the population as a whole, and in fact by these measures the standard of living worsened significantly in the later decades of this period.

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I. Introduction

Despite the obvious and ultimately fatal shortcomings of the Soviet system of central planning, the Soviet growth model nevertheless achieved impressive rates of economic growth and promoted the rapid industrialization of the USSR, particularly in the decades from the 1930s to the 1960s. Both Western and Soviet estimates of GNP growth in the Soviet Union indicate that GNP per capita grew in every decade in the postwar era, at times far surpassing the growth rates of the developed western economies. By this measure – and according to the propaganda spread by Soviet promoters – the standard of living in the country rose concurrently with rising GNP per capita. Yet due to the highly restricted publication of data and the questionable quality of the data that were published, little is known about the standard of living in the Soviet Union in the postwar era. Some trends, such as the decline in male life expectancy that began in 1965, suggest a deterioration of living standards; however this decline itself remains a puzzle, and little additional evidence has been available to assess other aspects of living standards in the USSR since the second World War. The question of whether the standard of living rose or fell in the Soviet Union in the postwar period is an important one, as our judgment of the Soviet growth model must rest not only on the rates of economic growth it achieved, but also on whether this growth translated into improved well-being for the population as a whole.

This paper reassesses the standard of living in the Soviet Union using a number of previously unexploited data sources. The focus is on alternative measures of well-being, in particular child and adult heights and infant and adult mortality, all of which directly measure the well-being of a population in terms of health status, nutrition and longevity. These biological indicators are a useful supplement to traditional measures of living standards, such

as real income or wages, because the latter may be misleading if measured incorrectly and in any case can only measure the means by which the good health and nutrition of a population can be achieved. In addition, it is important to examine alternative measures of well-being in the Soviet Union because GNP and other economic data were of unusually poor quality and reliability in that country.

The data used in this paper comprise previously unpublished data on adult and infant mortality in the USSR and across Russia's regions from 1959 to 1979, collected from the Soviet archives, as well as the results of anthropometric studies of children and adolescents conducted across the Soviet Union from 1955 to the early 1990s. These data are supplemented by a study of trends in adult heights by year of birth which provides a window on living conditions in the early childhood years of each cohort. Overall, these data paint a picture of a society far behind other developed countries in the health status of its population in the early postwar era. For example, children born in the mid-1950s reached only the 10^{th} to 25^{th} percentile by height on U.S. growth charts, suggesting widespread stunting of children during that period. However, substantial and rapid improvements in child height and birth weight were recorded in subsequent years, so that by the late 1960s children reached the 40^{th} percentile of U.S. child growth. A period of decline followed, marked by a large and growing infant and adult mortality gap with western countries and by falling birth weights and child heights. It appears that the high GNP growth rates achieved in the Soviet Union in this period failed to translate into continuous improvements in well-being for the population as a whole, and in fact by many measures the standard of living worsened significantly in the later decades of this period. In light of the growing body of evidence that serious adult morbidities such as stroke and heart disease develop in infancy and early childhood (Barker 1989, 1995, 1997, 1998), it is

likely that the deteriorating living conditions of the USSR of the 1970s sowed the seeds for the extraordinarily high mortality rates experienced in Russia and other countries of the former Soviet Union in the 1990s.

The outline of the paper is as follows. Section II presents a brief overview of what is currently known about economic growth and consumption in the Soviet Union. Section III describes the new data sources used in the paper; Section IV discusses the use of anthropometric data as an alternative measure of living standards and analyzes the data on child and adult heights. Section V examines the trends in infant and adult mortality in this period, and Section VI concludes.

II. Previous assessments of economic growth and well-being in the USSR

Economic growth in the Soviet Union was the subject of intense scrutiny for many years by the CIA and western Sovietologists, in part due to the importance of the issue for U.S. national security interests, but also due to the extraordinary effort required to make Soviet economic statistics comparable to U.S. measures and to correct for the deficiencies in the data published by TsSU, the Soviet statistical agency. This section of the paper briefly reviews the estimates of national income growth and consumption in the Soviet Union calculated by various investigators, to provide a background against which to assess the alternative measures of well-being presented in the following sections of the paper.

Before turning to the estimates of national income growth in the USSR, it is worthwhile to note some of the shortcomings of Soviet economic data; indeed, as Easterly and Fischer state, "the fundamental problem in evaluating Soviet growth is data quality" (1994, p. 3). The problems fall into three main categories: incentives for misreporting; methodological

differences between Soviet and Western national income accounting practices; and selective publication of data.[1] Regarding incentives for misreporting, the work of all economic units, from factory floor to central ministries, was judged based on the fulfillment of plan targets established annually at all levels. Given this, it is clear that the incentive to over-report pervaded the entire system, raising doubts about the credibility of most reported economic magnitudes. Equally problematic were the differences in methodological approaches to national income accounting between the USSR and developed market economies. For ideological reasons, for example, important components of national income – such as services and interest on capital – were excluded from the national accounts of the Soviet Union (services were excluded because they were considered "nonproductive"; interest on capital because it was considered a non-legitimate factor payment). The lack of market prices in the Soviet Union also complicated the task of researchers assessing Soviet growth, and particularly those wishing to compare Soviet growth with growth in developed countries in which prices more closely reflected shadow prices. The third major problem with Soviet economic data was selective publication, in which data considered to be embarrassing were simply suppressed, or definitions changed to suit the purposes of propaganda. The poor quality and questionable reliability of Soviet economic data means that a high degree of uncertainty surrounds the estimates of GNP growth in the country, and underscores the importance of examining alternative measures of well-being. Anthropometric indicators such as height are also advantageous because they take into account that some economic activity is non-monetized and therefore unmeasured by conventional indicators of living standards. This is particularly beneficial for the Soviet Union, because, as is well-known, increasing shares of economic

[1]See Ofer (1987) and Fischer (1994) for more detailed discussions of these problems.

activity took place in the "second economy" of the USSR as macroeconomic imbalances intensified in the 1970s and 1980s.

Keeping these data-quality caveats in mind, the range of estimates of national income growth for the Soviet Union is shown in Table 1. By any measure this growth record is impressive, particularly in the early postwar years when Soviet economic growth exceeded U.S. growth by a substantial margin, even using the more conservative Western estimates of Soviet growth. In later years growth began to slow, declining from an average annual rate of 6.0 percent in the 1950s to 2.0 percent in 1980-1985 (using the Bergson/CIA estimates). Comparing the Soviet growth record with that of the OECD and the United States, the growth rate of GNP per capita in the Soviet Union equaled that of the OECD for the 1950-1980 period (3.3 percent annual average) and exceeded that of the U.S. by a significant amount, at 3.3 versus 1.9 percent, respectively, from 1950 through 1980 (Table 2). In the last decade of the period, 1970 - 1980, GNP growth per capita was roughly similar in all three regions, averaging about 2 percent annually over those years. The sources of the slowdown in economic growth in the Soviet Union remain a topic of debate among scholars, with deteriorating productivity growth and low elasticity of substitution in industry likely the most important contributing factors.[2] While it is clear that Soviet growth rates declined after the 1950s, the Soviet growth record in the postwar period nevertheless compares reasonably well with that of the developed market economies. Based on this measure, at least, there was little reason to suspect that living standards may have been declining during this long period of positive economic growth.

Household consumption data also support the picture of rising living standards throughout this period; the growth in per capita household consumption met or exceeded the

[2]See the discussion of this issue in Ofer (1987) and Easterly and Fischer (1994).

growth rates of household consumption in the OECD and the United States over the entire 1950 - 1980 period (Table 2), as Soviet leaders allowed consumption to grow relatively rapidly until the early 1980s. According to Gur Ofer, this created a "radical change in the quality of life in the Soviet Union" (Ofer 1987, p. 1790), with an increased variety and quality of goods leading to significant improvements in the standard of living. This progress was further enhanced by the massive expansion of the public health care system and educational facilities across the country, with the vast majority of these services provided for free by the government.[3]

While the consumption growth record seems clear, it should be kept in mind that this growth took place in the context of a relatively low initial level of consumption, particularly in comparison with the U.S. and the OECD. As a result, even with rapid growth the absolute level of household consumption remained well below that of the United States throughout the postwar period. Estimates vary widely, but per capita consumption in the USSR likely reached no more than one-third that of the United States in the mid-1970s, and probably declined in subsequent years. Schroeder and Edwards (1981) estimate Soviet consumption per capita at 34.4 percent that of the United States in 1976, while Bergson (1991) calculates a proportion of 28.6 percent by 1985; even the Soviet statistical agency itself estimated that consumption per capita reached only 30 - 33 percent that of the U.S. in 1980 and fell to 22 - 26 percent by 1985 (Bergson 1991). Most investigators made herculean efforts to correct Soviet consumption measures for the important sources of bias – the persistent shortages of consumer goods, the cost of time spent in search, the poor quality of goods, and the lower level of retail services –

[3]Chernichovsky *et al* (1996) and Tulchinsky and Varavikova (1996) provide useful overviews of the development of the public health service in the USSR.

but it remains likely that the actual level of consumption was even lower than the estimates given here, and the figures remain controversial. For example, Birman (1983) argues that actual Soviet consumption per capita reached only 22 percent of the U.S. level in 1976 when the data are properly adjusted for measurement problems.

Given the degree of controversy over these estimates it is difficult to draw clear conclusions regarding household consumption in the Soviet Union. Most analysts would likely agree that the level of per capita consumption in the USSR never exceeded one-third that of the United States, and that the level of consumption fell relative to that of the United States between the mid-1970s and mid-1980s. The lack of reliable information on Soviet consumption again underscores the benefits of examining alternative indicators of well-being in the USSR, such as anthropometric evidence and mortality, both of which are more objective measures of well-being than economic growth or consumption, and which are not subject to the data problems inherent in the more conventional measures of living standards. Because the Soviet statistical agency ceased publication of infant mortality rates and other demographic data in 1974, these indicators of living standards were unavailable to researchers until the mid-1980s when publication of a limited amount of mortality data resumed. These data revealed that male life expectancy had begun to decline in 1965 and that infant mortality rates started to rise in 1971, both nearly unprecedented developments in industrialized countries and both signals that, despite the apparent continuous improvements in economic growth and consumption in the USSR in the postwar period, a serious deterioration in the health of some groups in the population was well underway.

III. New data sources

The opening of the Soviet archives has provided researchers with new opportunities for investigating all aspects of life in the Soviet Union, including changes in health status, mortality, and the standard of living more broadly across the country. The two archives in which the mortality data are housed are the GARF archive (*Gosurdarstvennyi arkhiv Rossiiskoi Federatsii* (State Archive of the Russian Federation)) and the RGAE archive (*Rossiiskii gosudarstvennyi arkhiv ekonomiki* (Russian State Archive of the Economy)), both in Moscow. The infant and adult mortality data in the archives are tabulated on standardized reporting forms by region and USSR republic; most of the data are hand-written onto the forms and are enumerated simply as the total number of deaths in each category, e.g. by age group, cause, region and so on. Almost without exception the number of deaths by age group and region add up to the RSFSR and USSR totals in the archives and also agree with the published aggregates, indicating that systematic misreporting of deaths did not occur at this level. Data on deaths by sex, five-year age group and oblast or USSR republic in 1959, 1970 and 1979 were collected from the RGAE archive; these data were combined with data on the distribution of the population by age, sex and oblast or republic from the 1959, 1970 and 1979 censuses contained in the GARF archive to calculate age-specific death rates by region in those years.[4] Births and infant deaths by oblast and republic were collected for 1956 through 1975 from the GARF archive and were used to calculate infant mortality rates by region in those years. Additional data collected from the archives include average monthly wages by region for 1959, 1970 and 1980 and alcohol purchases in 1959 (from family budget surveys); these data are supplemented

[4]The specific location of each data series by *fond, opis* and *delo* is given in Appendix 1. Reporting forms on deaths are missing for a number of regions in 1970, so fewer observations on adult deaths are available for this year.

by published data on food consumption, divorce rates and urbanization in the relevant years.

The anthropometric data used in the paper are the birth weights and average heights of children and adolescents collected primarily by researchers at the Semashko Institute of Public Hygiene in studies initiated in the 1950s and continuing through the present day. Much of the data are published in the Semashko Institute volumes (1962, 1965, 1977, 1988, 1998). Most of the studies were conducted in schools by trained researchers according to uniform standards; on average in every region surveyed about 100 children of each sex at each age were measured for height and weight. The birth weight data were collected from maternity ward records and represent averages for each region based on several hundred to several thousand records in each region (the average number of observations for each region is 568). The Semashko data are supplemented by other anthropometric surveys of children in the USSR conducted by researchers and published in Soviet medical journals such as *Sovietskoye zdravookhraneniye* (*Soviet Public Health*) and *Zdravookhraneniye Rossiiskoi Federatsii* (*Public Health in the Russian Federation*); these sources are listed in Appendix 1. The data in these studies appear to be comparable to the Semashko data in terms of methodology, particularly in the standards used for measurement of children as well as for presentation of the data. These data are presented below both in raw form (i.e. height attained at each age in centimeters) and converted into percentiles of U.S. growth standards. These percentiles were calculated by Richard Steckel (1996) and are derived from the standard U.S. growth charts which are based on nationally representative surveys of well-nourished children in the United States taken in the 1960s and early 1970s; these growth charts are widely used and have been adopted by the World Health Organization (WHO) as the standard for evaluating child growth in developing

countries.[5] The child height data are supplemented with data on adult heights in Russia from second panel of the Russian Longitudinal Monitoring Survey (RLMS); heights were measured by trained interviewers in these surveys and are not self-reported.[6] For comparison, data on the heights of (native) adults in the United States are also included in the analysis; these data are from the National Health and Nutrition Examination Surveys (NHANES II) conducted in 1976 - 1980.

IV. Trends in child and adult heights in the Soviet Union

These anthropometric data are used here to evaluate the health and nutritional status of the Soviet population in the postwar period, and, more broadly, to assess the standard of living across regions and in the country as a whole. This use of anthropometric data draws on the pioneering work of researchers such as Robert Fogel and Richard Steckel, which has demonstrated that anthropometric data can provide a wealth of information on the living standards of the past and present, and can be particularly useful when data on traditional measures such as GNP are absent or of questionable quality (Fogel 1986, 1991, 1994; Steckel 1979a, 1979b).[7] More specifically, the influences of past and current nutritional status are reflected in adult heights and body mass indices (a measure of weight for height): adult height is a cumulative measure of nutritional status in infancy, childhood and early adulthood, while the body mass index is an indicator of current nutritional status. Both adult height and the

[5]See U.S. Department of Health, Education and Welfare (1976) for a description of the surveys and methodology for constructing the growth charts.

[6]A detailed description of the sampling design and implementation of the RLMS, as well as data access, is available at the RLMS website at http://www.cpc.unc.edu/rlms.

[7]See Steckel (1995) for a survey of research in this area.

body mass index have been found to be strong predictors of the probability of dying, and the ideal measures of these appear to be constant over time and across countries.

Stature as a measure of living standards has several advantages over more conventional measures. It is a measure of net nutrition in the sense that it takes into account not only the inputs to health – nutrition, health care – but the demands placed on an individual's biological system as well, such as through disease and work intensity in the growing years. Even a mild illness during the growing years will tend to slow growth, and although catch-up growth is possible it will depend on the availability of sufficient caloric and nutrient intake to enable such growth. It has now also been established that psychosocial stress can slow a child's growth, because stress affects the secretion of the growth hormone (Eveleth and Tanner 1990). In addition, stature and family income are usually highly correlated, which one might expect given that family income is closely linked with the ability to purchase health inputs and with the demands on these inputs; height is also especially sensitive to income at low income levels (Steckel 1995). Even within developed countries, however, height still rises with socio-economic class (Eveleth and Tanner 1990). Child height has an advantage as an indicator of welfare over adult height because for adults the causality between income and stature may run in both directions, with healthier (taller) individuals able to be more productive and earn higher wages (see Strauss and Thomas 1998). For children this direction of causality is implausible; in addition children are more sensitive to environmental insults, especially in the years of rapid growth (infancy and the adolescent years, i.e. age 10 to 14). Indeed it appears that adult height is largely determined by age 3 to 4, and is affected even by nutritional inputs during the fetal growth period (Thomas 2001). While genetic influences in part determine individual height, at the population level nearly all differences in average height are the result of environmental

influences, enabling one to compare stature across countries and over time. In other words, well-nourished populations tend to follow the same growth curves, whether the population is European, African, or North American in origin (Martorell and Habicht 1986).[8] Because of the comparability of heights across populations and over time, and due to the clear link between height and nutritional status, stature is viewed as a useful index of the standard of living.

Table 3 presents the trends in stature of children in Moscow, likely the most well-nourished children in the Soviet Union and with access to the best health care. On the eve of the second World War, Muscovite children were remarkably short in stature: boys age 16, for example, reached only the 5th percentile on U.S. growth charts; girls reached the 18th percentile. Because the heights in Table 3 are the average heights of a sample of children and heights are usually normally distributed (Steckel 1996), this implies that a substantial share of children in Moscow were stunted in growth.[9] Conditions improved significantly by the late 1960s, with boys age 16 reaching the 43rd percentile of growth and girls the 48th in 1969. However, in the early 1970s growth appeared to halt or even regress: 16 year-old boys met only the 34th percentile of U.S. height standards on average, girls the 37th. As will become evident, this pattern persists across many regions of the Soviet Union during this period. By the early 1990s conditions had improved – at least in Moscow – and 16 year-old boys achieved the 50th percentile of growth. Note that the percentiles of growth for girls exceed the percentiles of growth for boys for many time periods; this is consistent with research indicating that males are

[8]The one exception to this rule appears to be individuals of Far Eastern origin; height differences between Far Eastern populations and other populations may have a genetic basis.

[9]Stunting is defined as height below two standard deviations of the median of the reference population. Note that the average heights in these surveys are likely biased upward because researchers sometimes excluded children who appeared to be poorly nourished (ref).

more sensitive to environmental insults than are females (Eveleth and Tanner 1990).

Figures 1a and 1b illustrate the anthropometric data for all regions graphically, showing the percentiles of growth achieved by boys and girls ages 4, 6, 9 and 10 by year of birth.[10] The data used in the analysis are for urban areas only, due to limited data availability for rural areas, and focus on children in this age range to minimize the diverse effects of growth spurts during the high-velocity growth years of infancy and adolescence. These graphs that children in Moscow (region 16) were taller on average than children living in other regions of the country, as would be expected given the greater and more diverse supply of food in Moscow as well as the better health facilities. In all urban areas of the country, boys and girls reached no higher than the 20th - 30th percentiles of growth on average in the mid- to late-1950s; even in relatively well-supplied cities such as St. Petersburg (region 7) and Nizhny Novgorod (region 28) 4- and 6-year-old boys failed to reach the 25th percentile on average on U.S. growth charts. Moreover, children in rural areas (not shown) almost uniformly achieved lower stature than did children in urban areas. In Ryazanskaya oblast in the Central region, for example, urban children age 8 grew on average to 124.9 cm in 1960, or the 20th percentile on U.S. growth charts; the average height of rural children in Ryazanskaya oblast reached only 122.7 cm or the 11th growth percentile in the same year. By 1970 these differences had widened – although children in both urban and rural areas achieved higher stature – with the average height of children age 7 in urban areas at 125.6 cm (50th percentile) and in rural areas at 120.0 cm (21st percentile). Because the data for rural areas are limited, this analysis focuses on child growth in urban areas and therefore clearly overstates the average child growth rates in the country as a whole.

[10]A key to the region codes in Figures 1a, 1b and 2 follows Figure 2 on page xx.

Overall these graphs paint a picture of widespread stunting of children born in the 1950s, rapid growth in child and adolescent stature in the 1960s, and a marked slowdown or halting of growth for children born in the early 1970s. As late as the mid-1980s child stature on average remained well below U.S. height standards in most regions. The substantial and rapid increases in height across most regions and birth cohorts in the USSR in the 1955-1969 period indicate that significant improvements likely occurred in the nutrition, sanitary practices, and public health infrastructure in the country in that period. This evidence also suggests, however, that these conditions began to deteriorate soon thereafter.

Similar trends are evident in the average birth weights across regions over the period (Figure 2). Birth weight is considered to be an excellent indicator of infant health, and due to its sensitivity to socioeconomic influences it is often used as a measure of living standards. As illustrated in Figure 2, average birth weights increased from the mid-1950s until about 1970 – particularly for boys – then appear to have declined from 1970 onward. It should be noted, however, that the average birth weights shown in Figure 2 for 1970 – roughly 3500 grams – exceeds the median birth weight in the U.S. in that year, which was approximately 3300 grams (U.S. Bureau of the Census, 1995).

These trends are corroborated by a study of current adult heights in Russia taken from the Russian Longitudinal Monitoring Survey. As noted above, adult height is largely determined in early childhood (i.e., age 3 to 4) including the fetal period; like child stature adult stature also reflects the cumulative effects of nutrition and exposure to disease in early childhood. Figure 3 illustrates the trend in adult heights by date of birth and by sex over the

1939 - 1978 period, and includes a similar graph for the United States for comparison.[11] Again it is clear that final attained height increased rapidly for children born from 1940 until the late 1960s, with a relatively brief period of stagnant growth around 1950 - 55. The increase in stature averaged about 2 centimeters per decade between 1940-1950 and 1960-1970, which is comparable to or exceeds the average rates of increase in stature in developing countries in the twentieth century (see Strauss and Thomas 1998). The average height of adult men born in the early part of the century in Russia was well below that of U.S. men (e.g., about 171 cm in Russia versus 175 cm in the U.S. in 1940; men in the U.S. had reached a height of 171 cm by 1750 (Costa and Steckel 1995)), but by the late 1960s men in both countries attained an average height of about 177 cm, and female height in Russia exceeded that of the U.S. by about one centimeter.[12] The striking feature of Figure 2, however, is the break in the upward trend in heights that began around 1970 (for men) and 1973 (for women): average heights of men declined between 1970 and 1978, and stagnated for women in those years. The timing of this decline in adult heights is the same as the timing of the stagnation in child heights discussed above, and is nearly identical to the timing of the increase in infant mortality rates in the Soviet Union, to which we now turn.

[11]The samples used are for prime-age adults (age 23 - 55) and contain 4,296 observations for men and 4,618 observations for women. The graph illustrates locally weighted smoothing (or lowess) estimates of the relationship between stature and exact date of birth. Lowess is a nonparametric estimator that uses a small amount of data near the point in order to generate smoothed values of height. The procedure is described in Cleveland (1979).

[12]Note that the U.S. population now lags behind many other developed countries in average heights of adults: average height in Germany, Sweden, Norway, the Netherlands, Denmark, and the U.K. exceeds that of the United States by 3 - 7 cm. See Komlos and Baur (2003) for a discussion.

V. Trends in infant and adult mortality in the USSR

Infant mortality rates supplement the anthropometric data because they are a reasonably good proxy for low birth weight and have been widely used as measure of the quality of life across countries, and are available across all of Russia's regions in the 1955 - 1975 period. Infant mortality rates in the Soviet Union have attracted the attention of demographers and social scientists for years, particularly after 1986 when the Soviet statistical agency resumed publication of mortality data (publication of detailed mortality data ceased in 1974; see Anderson and Silver 1990), which revealed a dramatic increase in infant mortality rates in the Soviet Union beginning in the early 1970s. The trends in urban and rural infant mortality rates in Russia from 1960 to 1989 are shown in Figure 3; this figure reveals that, while infant mortality rates fell sharply from 1960 to 1970, the trend reversed in Russia in 1971 and particularly affected the rural areas of the country. Rising infant mortality rates in the Soviet Union have been quite controversial among demographers, with a heated debate ensuing between those who argue that the increase was an artefact of improved birth and death registration in the less developed regions of the USSR (such as the Central Asian republics and the North Caucuses) and those who argue that the increase in infant mortality rates was real and reflected deteriorating conditions in the public health infrastructure due possibly to budgetary cutbacks.[13]

While the archival data on infant mortality cannot resolve this issue completely, they

[13]See the debate between Jones and Grupp (1983), Anderson and Silver (1986), and Velkoff and Miller (1995). Note that Soviet infant mortality rates are not directly comparable to Western infant mortality rates, because the Soviet data exclude live-born infants of less than 28 weeks gestation, less than 1000 grams in weight, and less than 35 centimeters in length who die within 7 days of birth (which are included in the WHO-recommended definition of infant mortality). Anderson and Silver (1986) estimate that Soviet infant mortality rates would be 22 to 25 percent higher if the data were adjusted to include these deaths.

can shed light on the controversy because they show the trends in infant mortality rates across all regions of Russia (as well as all regions of the USSR in general). If the increase in infant mortality rates was due only to improved registration of births and infant deaths, one would not expect infant mortality rates to have increased in the more developed regions of Russia, such as Moscow, which had achieved essentially complete vital event reporting decades earlier. However, as is evident in Table 4, which shows the percentage change in infant mortality rates across Russia's regions between 1971 and 1975, infant mortality rates rose dramatically even in Moscow, with a 14 percent increase over that period. The largest increase in infant mortality was registered in Khabarovskii Krai (on the far eastern coast of Russia), at nearly 60 percent, followed by Altaiskii Krai in Western Siberia at almost 50 percent. However there is no obvious regional pattern in the increases in infant mortality rates, with large increases registered in such diverse regions as Moscow, Novgorod and Saratov, and improvements recorded in other areas such as Leningradskaya oblast and Tyumenskaya oblast (the latter in Western Siberia). There is a strong negative correlation between the percentiles of child height and infant mortality across Russia's regions in 1970 (correlation = -0.83), but this only confirms the evidence provided by child heights and infant mortality rates separately: in the late 1960s or early 1970s, the health status of infants and children in the Soviet Union began to deteriorate markedly.

A similar deterioration occurred among adult several years earlier. The unfavorable trends in mortality and life expectancy in the Soviet Union in the postwar period have long been known and, some argue (e.g., Eberstadt 1993), should have been taken as the first signal that the impressive rates of economic growth in the USSR either were exaggerated or failed to translate into an improved standard of living for the population. The trends in male and female

life expectancy at birth are shown in Figures 5 and 6 for Russia, Ukraine and Lithuania, along with the United States for comparison. In Russia – and in the Soviet Union as a whole – life expectancy improved rapidly from the mid-1950s to the early 1960s (at least in part due to the large declines in infant mortality in this period) and in most republics life expectancy reached or exceeded that of the United States. Around 1965, however, male life expectancy in the Soviet Union began to decline and female life expectancy failed to improve, resulting in a gap of nearly 8.5 years in life expectancy between Russian and U.S. men by 1980, and a gap of 4.3 years for women in that same year. As is evident from Figures 5 and 6, the decline in male life expectancy was largest in the Russian republic, but a similar pattern of deterioration occurred in the other republics as well.

Little is known regarding the underlying reasons for this startling and unprecedented decline in male life expectancy. Dutton (1979) was among the first to note increasing adult mortality in the Soviet Union in the mid-1960s and hypothesized a link with Soviet drinking habits. Others argued that declining life expectancy was due to excess mortality experienced by cohorts who were born during or fought in World War II (Dinkel 1985; Anderson and Silver 1989b). The latter authors (1989a) also argue that declining life expectancy was partly the result of improved accuracy of death registration at the older ages, particularly in the 1960s and 1970s. However, even when the mortality data are adjusted for improvements in the accuracy of death registration, the negative trends in life expectancy from the 1960s to the 1980s persist (Blum and Monnier 1989). While the earlier literature is largely agreed on the general trends in mortality and immediate causes of death in the former USSR, few researchers systematically investigated the underlying reasons for the trends and thus little consensus on these reasons emerged.

Additional information on adult mortality has come to light recently with the opening of the Soviet archives to researchers. A team of Russian and French demographers has painstakingly reconstructed mortality by detailed cause of death and by five-year age group for Russia, Ukraine, and the Baltic republics, using the original records from the Soviet statistical agency stored in the archives. The results of this reconstruction for Russia are presented in Shkolnikov *et al* (1996a, 1996b) for the years 1970 - 1993.[14] To briefly summarize their findings, deteriorating male life expectancy in the 1970 to 1980 period was due to increased deaths from cardiovascular disease; rising deaths due to trauma also contributed significantly to higher male mortality rates. Of the violent deaths, the most important increases in mortality rates were those from homicide, accidental poisoning and alcoholism. Note that in developed countries, the period from 1970 to the present has been a period of long-term decline in mortality from cardiovascular disease as well as from violent deaths.

Little can be added to the extensive analysis of the mortality data by cause provided by Shkolnikov and co-authors. However, some additional insight into the mortality trends can be gained by examining age-specific death rates at the regional and republican levels. Figure 7 illustrates changes in age-specific death rates for men and women by urban and rural areas of the Russian republic between 1959 and 1979, calculated from data on deaths and age structure of the population collected from the RGAE and GARF archives. The largest increase in death rates in this period occurred for men age 40 to 44, a nearly 50 percent increase in the death rate in this age group; dramatic increases in death rates also occurred among men age 45-49 and 25-

[14]See these studies for an overview of the system of death registration and classification in the Soviet Union, as well as for a discussion of data quality issues surrounding the mortality data. In general, the quality of the mortality data is considered to be high, at least in the European republics of the Soviet Union and for broad categories of death.

39. In contrast, death rates improved for women in most age groups in this period. Examining urban and rural areas separately (panels b and c), the increase in male death rates was primarily driven by the large increases in death rates among men age 40 - 54 living in urban areas; the increases in male death rates among the rural population were concentrated in a younger age group (age 20 - 44). As emphasized by Shkolnikov *et al* (1996a) and underscored by these data, it is clear that declining male life expectancy in the Russian republic in the 1965 - 1980 period reflects a significant worsening of mortality among middle-aged men, rather than an increase in death rates of infants or the elderly. Needless to say this is a highly unusual pattern of mortality.

This pattern was repeated across all European republics of the Soviet Union. As shown in Figure 5, male life expectancy declined in Ukraine and Lithuania over the same period; it declined as well in Belarussia and the other two Baltic republics, Latvia and Estonia. The age pattern of the increase in death rates was similar to that of Russia, with men age 40-49 experiencing the largest increase in death rates. Whatever caused rising adult male mortality in Russia, it seems clear it was not unique to that republic alone.

Are there any regional patterns to this increase in death rates? To investigate this question, Figure 8 illustrates the change in death rates for men age 40 - 44 by the regions of the Russian republic. As with the infant mortality rates, it is not simply the most rural regions with the least well-developed vital registration system experiencing large increases in mortality rates, which one might have attributed to improvements in the vital registration system. Quite surprisingly, some of the most industrially advanced regions in the country registered the highest increases in death rates in this age group: Orlovskaya, Bryanskaya, Vladimirskaya, Ivanovskaya, Moskovskaya and Tulskaya oblasts, all in the Central region surrounding

Moscow; in Moscow itself the male death rate in this age group increased by over 60 percent between 1959 and 1979. The regions that experienced an improvement in the mortality rate in these years (Magadan in the Far East) or a relatively small worsening of the death rate (Sakha in the Far East; Murmansk in the Northwest) appear to have little in common geographically or economically, so no obvious explanation presents itself to explain the large regional differences in changing mortality rates. Note also that there is little correlation between the change in adult male mortality rates and the change in infant mortality rates across Russia's regions in the early 1970s (correlation = -0.07). For example, Magadan was one of the few regions with improved adult male mortality in this period, yet it also experienced one of the largest increases in infant mortality rates in the early 1970s (Table 4). This suggests that the factors affecting adult health in this period differed from those that caused the increase in infant mortality rates.

What caused the decline in male life expectancy in Russia between 1959 and 1979? While data are extremely limited, it is possible to test the correlation between changes in adult mortality rates by age group and changes in several economic and social variables between 1959 and 1979. Ideally one would like to test the hypotheses, suggested by the previous literature on adult mortality in the Soviet Union, that rising male deaths in the working ages were due to a combination of rising alcohol consumption and a poor diet increasingly comprised of fatty meat and other high-cholesterol foods, as well as limited fruit and vegetables. Smoking is likely a contributing factor as well. Unfortunately, however, much of these data appear to be unavailable, even unpublished data in the Soviet archives.

The data that are available across Russia's regions in this period include the following variables: average monthly wages, divorce rates, share of the population living in urban areas, share of men or women with higher education, per capita consumption of broad categories of

foods, and a very limited number of observations on average purchases of alcohol (in liters) per capita. Table 6 shows the results of regressions that regress the percentage change in the death rate by selected age group for 1959 - 1979 on percentage changes in other variables across Russia's regions. For younger men (age 30-34) there appears to be a positive relationship between death rates and wages; the relationship is statistically insignificant for older men and for women of all age groups (columns 1, 4, 7, 10). The former finding is consistent with research on the U.S. which shows that higher income appears to lead to higher mortality rates for young men (Deaton and Paxson 1999; Ruhm 2000). The lack of a relationship between income and mortality for other age groups is inconsistent with most other research which indicates that higher income is generally protective of health. While the lack of precision with which this effect is estimated may simply be due to the small sample sizes, it also suggests an alternative explanation which is plausible for the Soviet Union in this time period: in an environment of increasing shortages of consumer goods combined with a nationalized health cares system, it is possible that increments to income in the Soviet Union did not translate into additional purchasing power toward the inputs to health. In other words, wages and incomes may have become increasingly irrelevant to health and nutrition as macroeconomic imbalances worsened in the Soviet Union in this period. A crude test of this hypothesis, discussed below, provides mixed evidence in support of this idea.

Adding other variables, the share of the male population with higher education is significantly related to the change in death rates, with the expected sign: regions with a greater increase in this measure of education experienced a smaller increase in death rates over the period for men in both age groups. For women, however, the relationship is statistically insignificant. Urbanization has a negative relationship with death rates only for women age

30-34; changes in the divorce rate – included as a possible proxy for social and family structure changes occurring over the period – is unrelated to changes in the death rate for all groups. Columns (2), (5), (8) and (11) add a variable for to test the idea that the increasing macroeconomic imbalances negatively affected the health of the population: the change in the average per capita savings rate by region over the period. This is a crude measure of the 'monetary overhang' in the Soviet Union, which resulted from rising wages over the period combined with an increasing deficit of consumer goods on which to spend one's income. As indicated in column 2, this variable is statistically significant with the expected sign for men age 30 - 34: in regions with a larger increase in the savings rate, death rates were higher. The relationship is positive but only significant at the 16% level for 40-44 year-old men, while it has the incorrect sign for women age 30-34 (column 8).

Columns 3, 6, 9 and 12 add a variable for the change in per capita sales of alcohol, for which there are observations on only 33 regions. These limited data indicate a positive (but statistically weak) relationship between alcohol consumption and mortality for adult men, but a negative relationship for women age 40-44. One interpretation of these results is that alcohol consumption may lead to more violent and cardiovascular deaths for men, due to the excessive nature of drinking characteristic of Russian men, but is protective of the health of women who drink more moderately in Russia.

A number of measures of food consumption were included in these regressions, for example consumption of sugar, meat, milk and eggs; however in nearly all cases the results were highly statistically insignificant. Although the data are limited and undoubtedly affected by measurement error, this first pass at correlations shows little support for the idea that changes in diet accounted for the increase in adult male mortality rates in Russia between 1959

and 1979.

Given the differing patterns of death in urban and rural regions discussed previously, further insight into the correlates of death rates may be gained by examining urban and rural deaths separately; the results of these regressions are given in Table 7 (urban) and Table 8 (rural). To briefly summarize the results of these regressions, income remains positively related to mortality for urban men in both age groups and women age 30-34, and the education variable is negative and significant for urban men (but not women). The change in the divorce rate has a surprising negative relationship with death rates of all groups except men age 30-34, and the measure of the health care infrastructure – doctors per capita – is positively related to mortality change for urban men. While this may seem to be an indictment of the Soviet health care system, more likely it reflects that health care resources may have been directed toward regions with higher mortality rates. The effects of alcohol consumption on mortality appears to be driven by its relationship to mortality among the urban population, although the statistical relationship remains weak. Note that for the 1970 - 1979 period for which slightly better alcohol sale data are available, there is a positive relationship between mortality and alcohol consumption for men and women age 40 -44; this relationship is significant at the 6.6% level for men and the 2.2% level for women (results not shown). Finally, for rural women it does appear that wages and mortality are negatively related (Table 8, columns 7 and 10). To summarize, the evidence is suggestive that increased alcohol consumption and growing macroeconomic imbalances may have played a role in the rising adult mortality rates of the 1959 - 1979 period, but this is a tenuous conclusion given the data limitations.

V. Conclusion

Did the standard of living rise or fall in the Soviet Union in the postwar period? The conventional measures of GNP growth and household consumption indicate a long, uninterrupted upward climb in the Soviet standard of living from 1950 to 1989; even Western estimates of these measures support this view, albeit at a slower rate of growth than the Soviet measures. This growth record compares favorably with that of the United States, yet a stark contradiction emerges when one compares longevity in the Soviet Union and the United States: life expectancy continued its long upward trend in the latter country over these years, but for men in Russia the year 1965 marked the beginning of a period of decline in life expectancy that lasted until the early 1980s.

This evidence of deteriorating living conditions is corroborated by changes in four biological measures of the standard of living that also began to decline around this time: an apparently real increase in infant mortality rates; a stagnation or decrease in child heights; a decline in average birth weights; and a slight decline in the heights of men and women born in the early 1970s. In other words, what is currently known about living standards in the Soviet Union in the postwar period tells a conflicting story: positive economic growth and growing household consumption occurred simultaneously with rising infant and adult mortality rates and falling child and adult heights, a seemingly incongruous combination. Which story should we believe? In light of the data quality problems inherent in much of the Soviet economic data and even in Western estimates that seek to correct for the deficiencies in these data, and given the relative objectiveness with which height and mortality are measured, this would seem to argue in favor of believing the trends portrayed by stature and death rates. These trends suggest a substantial improvement in the standard of living in the 1950s and early 1960s, then a

worsening of the standard of living from the late-1960s or early 1970s until at least the early 1980s. Unfortunately the evidence remains inconclusive regarding the underlying causes of this deterioration in well-being, but declining availability of consumer goods and higher alcohol consumption may have played a role.

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Appendix 1: Data sources

Archival data:

Distribution of the population by age, sex, and RSFSR oblast or USSR republic, 1959 Census tabulations: GARF, F. A-374, op. 4, d. 1, 2, 3, 4

Distribution of the population by age, sex, and RSFSR oblast or USSR republic, 1970 Census tabulations: RGAE, F. 1562, d. 336, op. 4435, 4436, 4437, 4438

Deaths by age, sex, and RSFSR oblast or USSR republic, 1959: RGAE F. 1562, op. 27, d. 826

Deaths by age, sex, and RSFSR oblast or USSR republic, 1970: RGAE F. 1562, op. 47, d. 1421

Births and infant deaths by RSFSR oblast, 1971: GARF, F. 1562, op. 48, d. 1266, 1267; 1975: RGAE, F. 1562, op. 56, d. 1928

Average monthly wages by RSFSR oblast, 1959: GARF, F. A-374, op. 31, d. 2779

Average alcohol purchases, liters per person, by RSFSR oblast (family budget survey results): GARF F. 374, op. 31, d. 5299

Anthropometric studies published in Soviet public health journals:

(to be added)

Table 1. Estimates of national income (GNP) growth in the Soviet Union, 1928 - 1985 (annual rates of growth)

	Khanin	Bergson/CIA	TsSU
1928-1985	3.3	4.3	8.8
1928-1941	2.9	5.8	13.9
1950s	6.9	6.0	10.1
1960s	4.2	5.2	7.1
1970s	2.0	3.7	5.3
1980-85	0.6	2.0	3.2

Source: Fischer (1994), Table 7.4.

Table 2. Comparisons of Soviet and Western economic performance, 1950 - 1980 (annual rates of growth)

	Soviet Union			E-OECD		United States	
	1950-80	1960-80	1970-80	1950-80	1970-80	1950-80	1970-80
GNP per capita	3.3	3.1	2.1	3.3	2.3	1.9	2.0
Household consumption per capita	3.7	3.2	2.6	3.2	2.6	2.1	2.3

Notes: Soviet data are Western estimates. Data for E-OECD and the U.S. are GDP rather than GNP. Household consumption is at established prices for the Soviet Union, at factor cost for E-OECD and the United States.

Source: Ofer (1987), Table 2.

Table 3. Child anthropometric indicators in Moscow in the postwar years

	1939-40	1959	1969	1976	1980	1993	1939-40	1959	1969	1976	1980	1993
Age	Boys, height in cm						Boys, height in percentiles of US growth standards					
2	na	na	88.3	na	87.9	na	na	na	31	na	28	na
3	na	93.5	95.7	97.0	na	na	na	12	23	30	na	na
7	na	119.6	123.9	124.0	na	126.3	na	18	46	47	na	50
10	132.2	135.1	140.3	139.9	na	139.1	11	21	50	48	na	43
14	152.6	157.7	162.6	162.3	na	163.0	6	16	34	33	na	35
16	163.2	167.9	174.0	172.4	na	175.2	5	14	43	34	na	50
Age	Girls, height in cm						Girls, height in percentiles of US growth standards					
2	na	na	86.1	na	86.5	na	na	na	18	na	21	na
3	na	922.6	95.3	96.5	na	na	na	11	28	37	na	na
7	na	119.2	123.6	123.3	na	136.5	na	24	49	49	na	49
10	131.6	134.7	140.3	138.4	na	139.8	9	18	43	33	na	41
14	152.0	156.6	160.9	159.2	na	159.7	9	25	48	38	na	41
16	156.8	158.4	162.3	160.6	na	na	18	25	48	37	na	na

Figure 1a. Height of children in urban centers of the RSFSR by year of birth as a percentile of U.S. standards, boys

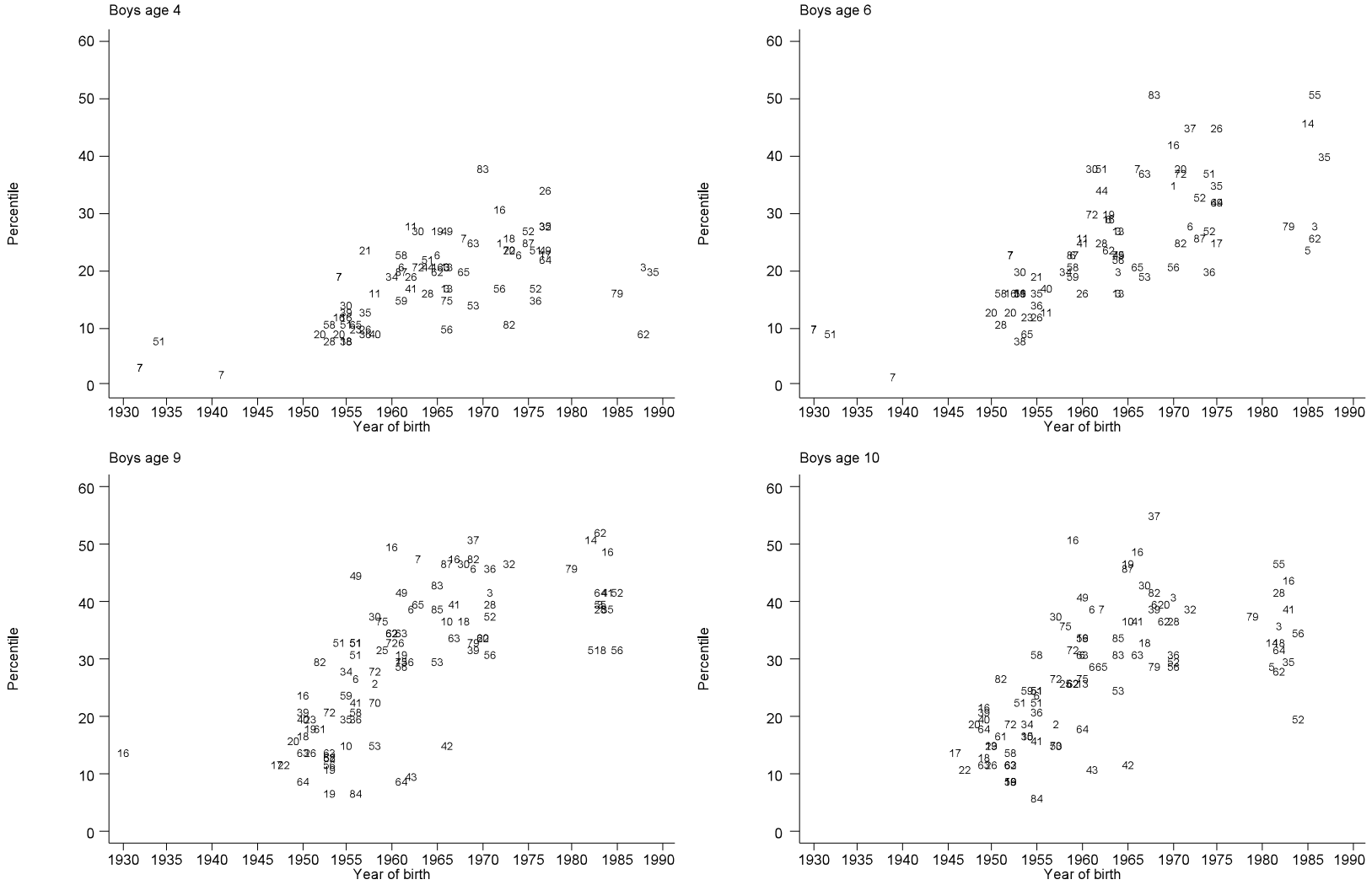


Figure 1b. Height of children in urban centers of the RSFSR by year of birth as a percentile of U.S. standards, girls

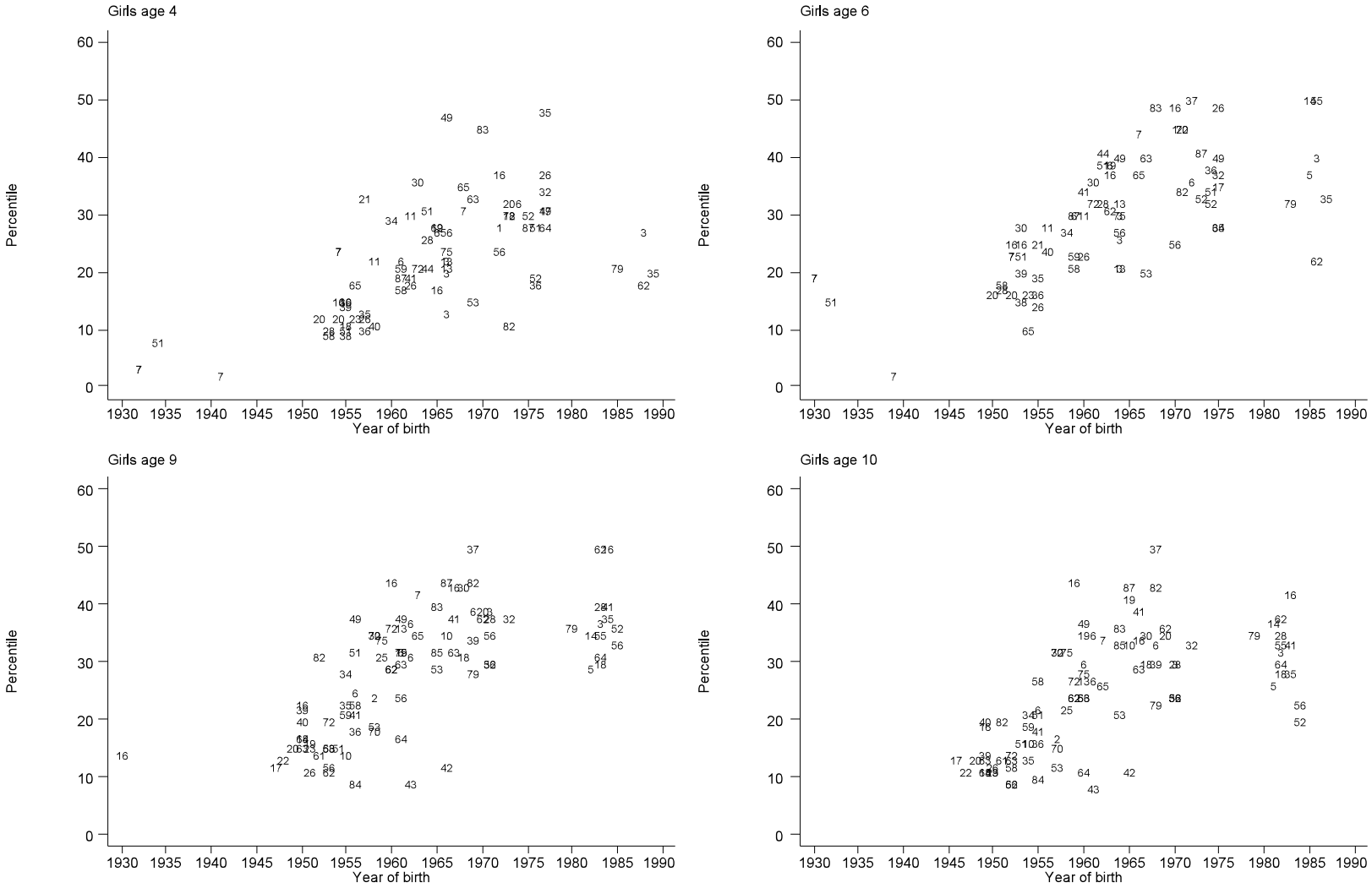


Figure 2. Birth weights of boys and girls over time in cities of the RSFSR, 1949 - 1981

Key to region codes:

Northern region
1 Karelia rep.
2 Komi rep.
3 Arkhangelskaya obl.
4 Nenetsky a.o.
5 Vologodskaya obl.
6 Murmanskaya obl.

Northwestern region
7 St. Petersburg
8 Leningradskaya obl.
9 Novgorodskaya obl.
10 Pskovskaya obl.

Central region
11 Bryanskaya obl.
12 Vladimirskaya obl.
13 Ivanovskaya obl.
14 Kaluzhskaya obl.
15 Kostromskaya obl.
16 City of Moscow
17 Moskovskaya obl.
18 Orlovskaya obl.
19 Ryazanskaya obl.
20 Smolenskaya obl.
21 Tverskaya obl.
22 Tulskaya obl.
23 Yaroslavskaya obl.

Volga-Vyatsky region
24 Marii el rep.
25 Rep. of Mordovia
26 Chuvashskaya rep.
27 Kirovskaya obl.
28 Nizhegorodskaya obl.

Central Chernozem region
29 Belgorodskaya obl.
30 Voronezhskaya obl.
31 Kurskaya obl.
32 Lipetskaya obl.
33 Tambovskaya obl.

Povolzhsky region
34 Rep. of Kalmykiya
35 Rep. of Tatarstan
36 Astrakhanskaya obl.
37 Volgogradskaya obl.
38 Penzenskaya obl.
39 Samarskaya obl.
40 Saratovskaya obl.
41 Ulyanovskaya obl.

North Caucuses
42 Rep. of Adygeya
43 Rep. of Dagestan
44 Kabardino-Balk. rep.
45 Karachaevo-Cherk. rep.
46 North Ossetia
47 Chechenskaya rep.
48 Ingushetiya rep.
49 Krasnodarskii krai
50 Stavropolskii krai
51 Rostovskaya obl.

Urals
52 Rep. of Bashkortostan
53 Udmurtskaya rep.
54 Kurganskaya obl.
55 Orenburgskaya obl.
56 Permskaya obl.
57 Komi-Permyaskii a.o.
58 Sverdlovskaya obl.
59 Chelyabinskaya obl.

West Siberia
60 Altai rep.
61 Altaiskii krai
62 Kemerovskaya obl.
63 Novosibirskaya obl.
64 Omskaya obl.
65 Tomskaya obl.
66 Tyumenskaya obl.
67 Khanty-Maniiskii a.o.
68 Yamalo-Nenetskii a.o.

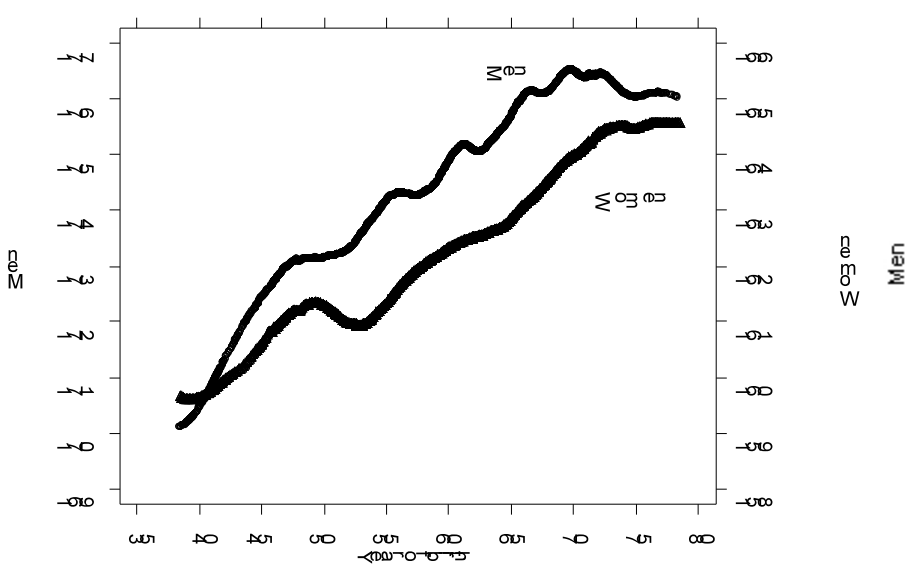
East Siberia
69 Rep. of Buryatia
70 Tuva rep.
71 Rep. of Khakasiya
72 Krasnoyarskii krai
73 Taimyrskii a.o.
74 Evenkiiskii a.o.
75 Irkutskaya obl.
76 Ust-Ordynskii a.o.
77 Chitinskaya obl.
78 Aginskii-Buryatskii a.o.

Far East
79 Sakha rep.
80 Evreiskaya a.o.
81 Chukotskii a.o.
82 Primorskii krai
83 Khabarovskii krai
84 Amurskaya obl.
85 Kamchatskaya obl.
86 Koryakskii a.o.
87 Magadanskaya obl.
88 Sakhalinskaya obl.

89 Kaliningradskaya obl.

Figure 3. Male and female adult heights, Russia and United States

Russia, 1939 - 1978



United States, 1935 - 1970

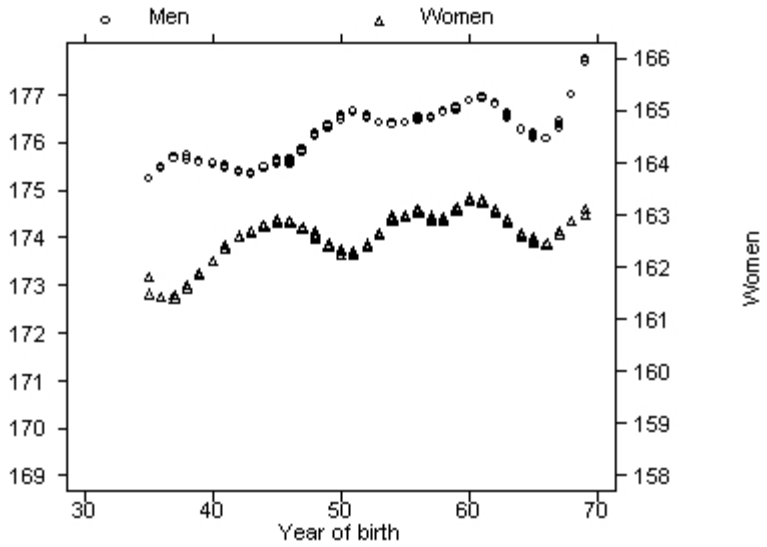


Figure 4. Infant mortality rates in Russia, urban and rural

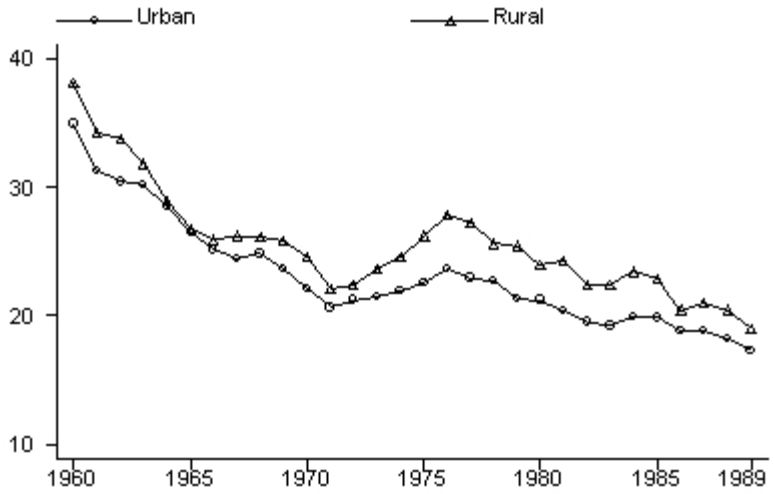


Table 4. Percentage change in infant mortality rates by Russian region, 1971 - 1975

	Infant mort. rate		% change		Infant mort. rate		% change
	1971	1975			1971	1975	
Leningradskaya obl.	19.9	18.0	-9.6	Rep. of Bashkortostan	20.1	22.4	11.5
North Ossetia	20.7	18.8	-9.2	Voronezhskaya obl.	17.7	19.8	11.8
Kabardino-Balk. rep.	29.2	26.8	-8.3	Vladimirskaya obl.	16.5	18.5	12.0
Chuvashskaya rep.	26.3	24.3	-7.7	Volgogradskaya obl.	21.6	24.3	12.6
Astrakhanskaya obl.	24.4	23.1	-5.4	City of Moscow	20.8	23.7	14.0
Marii el rep.	23.2	22.3	-3.5	Bryanskaya obl.	18.7	21.4	14.6
Nizhegorodskaya obl.	18.5	17.9	-3.0	Kemerovskaya obl.	21.2	24.3	14.7
Samarskaya obl.	22.8	22.3	-2.4	Orlovskaya obl.	16.3	19.1	17.4
Moskovskaya obl.	20.2	19.8	-1.9	Permskaya obl.	23.6	28.1	19.4
Tyumenskaya obl.	25.0	24.6	-1.8	Amurskaya obl.	24.9	29.8	19.8
Omskaya obl.	20.6	20.3	-1.6	Yaroslavskaya obl.	18.9	22.7	19.9
Pskovskaya obl.	24.0	24.0	-0.1	Chechenskaya rep.	19.3	23.4	21.1
Sakha rep.	27.9	28.2	1.0	Ryazanskaya obl.	16.3	20.0	22.5
Komi rep.	27.2	27.5	1.2	Primorskii krai	21.7	26.8	23.2
Kamchatskaya obl.	26.6	26.9	1.3	Tomskaya obl.	19.7	24.3	23.2
St. Petersburg	18.8	19.1	1.4	Rep. of Kalmykiya	26.0	33.1	27.3
Kostromskaya obl.	21.9	22.3	1.9	Sakhalinskaya obl.	18.5	23.6	27.4
Kurganskaya obl.	24.4	24.9	1.9	Tambovskaya obl.	18.1	23.0	27.6
Udmurtskaya rep.	21.4	22.2	3.4	Rep. of Buryatia	21.3	27.4	28.8
Murmanskaya obl.	17.5	18.2	4.0	Orenburgskaya obl.	17.7	22.7	28.8
Ivanovskaya obl.	21.1	22.0	4.3	Chelyabinskaya obl.	18.9	24.7	30.5
Tverskaya obl.	19.5	20.5	4.8	Novgorodskaya obl.	23.2	30.3	30.7
Ulyanovskaya obl.	20.0	21.0	4.9	Chitinskaya obl.	25.0	32.9	31.5
Tuva rep.	33.1	34.8	5.1	Saratovskaya obl.	16.5	21.9	32.8
Belgorodskaya obl.	15.2	16.0	5.3	Krasnodarskii krai	16.0	21.2	32.9
Vologodskaya obl.	21.5	22.7	5.6	Krasnoyarskii krai	23.8	32.0	34.2
Kirovskaya obl.	18.9	20.0	5.7	Rostovskaya obl.	20.6	28.0	36.2
Arkhangelskaya obl.	24.5	26.0	5.9	Stavropolskii krai	15.3	21.6	41.5
Rep. of Tatarstan	19.0	20.1	6.3	Magadanskaya obl.	24.1	34.2	42.2
Kaluzhskaya obl.	19.9	21.2	6.5	Novosibirskaya obl.	19.5	27.9	42.6
Sverdlovskaya obl.	21.5	23.1	7.4	Altaiskii krai	18.8	28.2	49.6
Irkutskaya obl.	25.2	27.4	8.4	Khabarovskii krai	21.2	33.7	58.9
Smolenskaya obl.	20.3	22.0	8.4				
Rep. of Mordovia	17.1	18.6	8.5				
Kurskaya obl.	20.4	22.2	8.7				
Lipetskaya obl.	19.8	21.6	9.3				
Penzenskaya obl.	19.1	21.0	9.6				
Rep. of Dagestan	41.4	45.5	9.9				
Karelia rep.	23.5	25.8	10.0				
Tulskaya obl.	21.1	23.2	10.2				
Kaliningradskaya obl.	20.4	22.7	11.4				

Figure 5. Male life expectancy at birth, 1958 - 1989

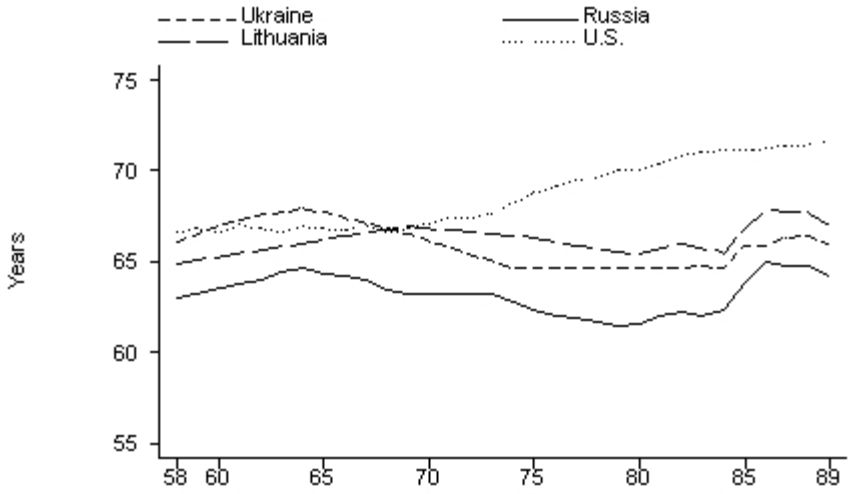


Figure 6. Female life expectancy at birth, 1958 - 1989

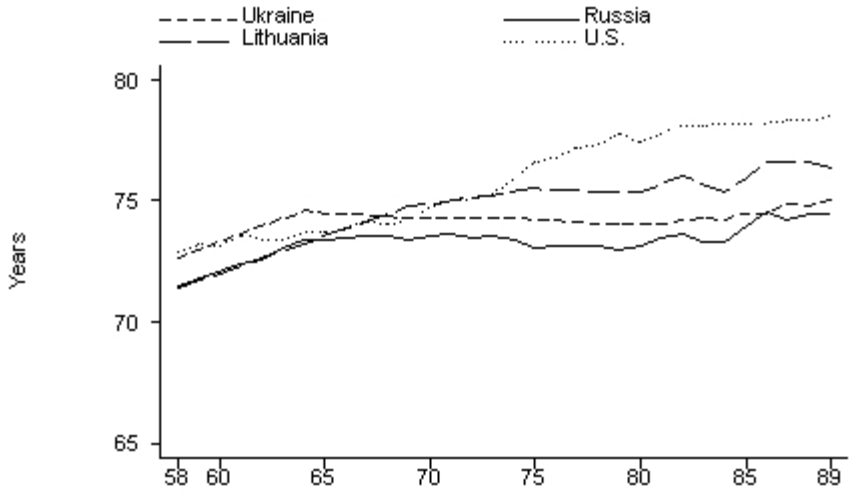
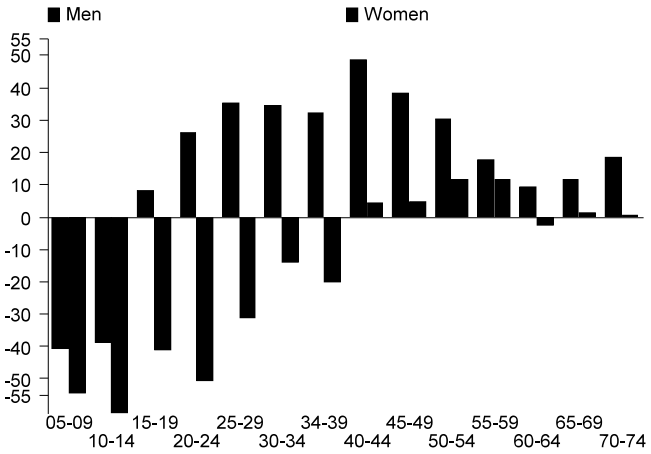
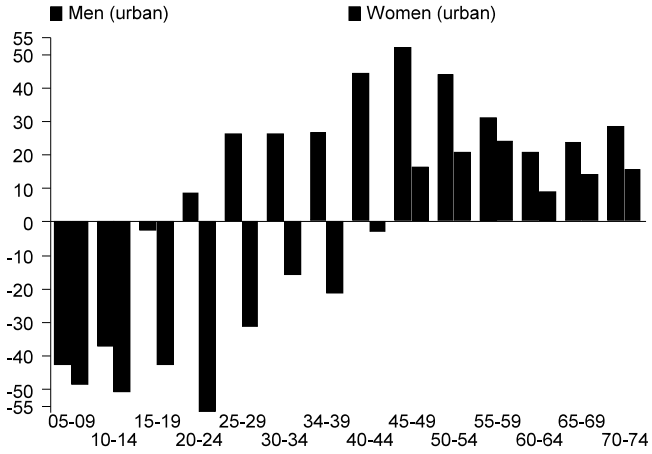


Figure 7. Percentage change in age-specific death rates, Russia, 1959 - 1979

a. All population



b. Urban population



c. Rural population

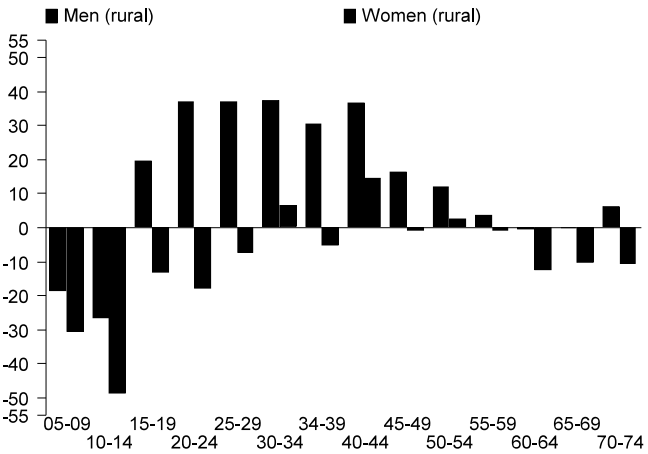


Figure 8. Percentage change in death rates across Russia's regions, men age 40-44, 1959 - 1979

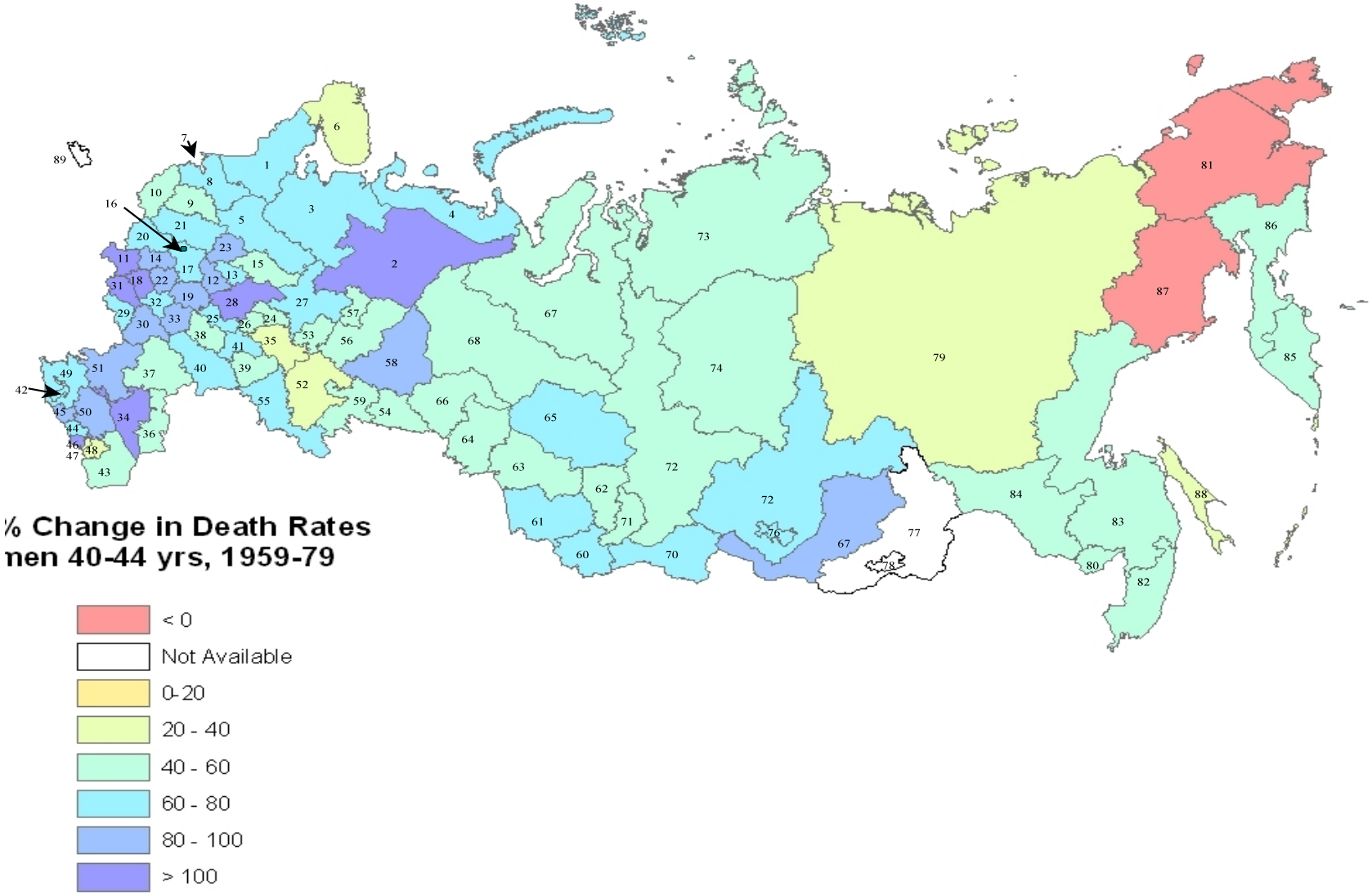


Table 6. Correlation between changes in age-specific death rates and other variables, 1959 - 1979, all population

	DV: % change in death rate by age group, men						DV: % change in death rate by age group, women					
	Age 30-34			Age 40-44			Age 30-34			Age 40-44		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
% change in average monthly wage	.437 (.186) [0.022]	.531 (.190) [0.007]	.332 (.162) [0.051]	.082 (.136) [0.547]	.122 (.134) [0.368]	.011 (.134) [0.938]	.249 (.214) [0.249]	.018 (.251) [0.943]	-.048 (.335) [0.888]	-.091 (.167) [0.587]	-.025 (.158) [0.876]	-.010 (.199) [0.960]
% change in share of pop. with higher ed.	-.496 (.155) [0.002]	-.503 (.126) [0.000]	-.105 (.217) [0.672]	-.259 (.123) [0.039]	-.337 (.128) [0.011]	-.091 (.189) [0.633]	-.101 (.366) [0.783]	.486 (.482) [0.317]	1.16 (.905) [0.211]	-.149 (.249) [0.551]	-.343 (.311) [0.275]	-.413 (.422) [0.337]
% change in urban pop.	.080 (.084) [0.342]	.054 (.085) [0.528]	-.237 (.207) [0.264]	.091 (.063) [0.153]	.104 (.067) [0.127]	-.038 (.183) [0.836]	-.242 (.126) [0.059]	-.250 (.124) [0.048]	-.347 (.271) [0.212]	-.045 (.085) [0.600]	-.036 (.093) [0.697]	-.281 (.172) [0.114]
% change in divorce rate	.025 (.098) [0.800]	-.079 (.115) [0.493]	.049 (.104) [0.639]	-.122 (.087) [0.162]	-.229 (.086) [0.010]	-.231 (.109) [0.044]	-.101 (.110) [0.360]	-.075 (.146) [0.610]	-.075 (.227) [0.744]	-.019 (.092) [0.837]	-.043 (.127) [.737]	.015 (.115) [.895]
% change in doctors per cap.	.572 (.144) [.000]	.350 (.151) [0.024]	-.234 (.186) [0.221]	.334 (.117) [.006]	.294 (.132) [0.030]	.125 (.198) [0.535]	.273 (.264) [.305]	.171 (.262) [0.517]	-.076 (.560) [0.893]	.311 (.194) [.114]	.358 (.199) [.077]	.171 (.271) [.533]
% change in saving rate	–	.444 (.131) [0.001]	.633 (.157) [0.000]	–	.167 (.118) [0.163]	.257 (.128) [0.055]	–	-.442 (.242) [0.073]	-.782 (.345) [0.049]	–	.123 (.152) [0.423]	.161 (.194) [0.413]
% change in per capita alcohol sales	–	–	.122 (.091) [0.191]	–	–	.113 (.072) [0.126]	–	–	-.062 (.146) [.673]	–	–	-.109 (.056) [.063]
Adj. R2	0.286	0.389	0.409	0.146	0.243	0.281	0.090	0.129	0.215	0.086	0.099	0.284
N	70	69	33	70	69	33	70	69	33	70	69	33

Note: Robust standard errors in parentheses; p-values in brackets. Regressions are weighted by average population in each region over the period.

Table 7. Correlation between changes in age-specific death rates and other variables, 1959 - 1979, urban population

	DV: % change in death rate by age group, men						DV: % change in death rate by age group, women					
	Age 30-34			Age 40-44			Age 30-34			Age 40-44		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
% change in average monthly wage	.409 (.171) [0.020]	.448 (.159) [0.006]	.447 (.145) [0.005]	.270 (.153) [0.083]	.263 (.163) [0.112]	.345 (.195) [0.089]	.398 (.224) [0.081]	.405 (.242) [0.099]	.507 (.337) [0.144]	.230 (.318) [0.471]	.227 (.305) [0.460]	.072 (.250) [0.777]
% change in share of pop. with higher ed.	-.466 (.158) [0.004]	-.338 (.149) [0.026]	-.143 (.197) [0.473]	-.405 (.150) [0.009]	-.414 (.181) [0.025]	-.280 (.186) [0.144]	.574 (.324) [0.081]	.624 (.337) [0.069]	1.46 (.592) [0.021]	-.277 (.246) [0.263]	-.270 (.230) [0.244]	-.477 (.334) [0.165]
% change in divorce rate	-.161 (.101) [0.115]	-.112 (.116) [0.339]	.085 (.101) [0.411]	-.191 (.075) [0.013]	-.156 (.093) [0.099]	-.155 (.113) [0.182]	-.382 (.113) [0.001]	-.277 (.133) [0.042]	-.238 (.205) [0.255]	-.305 (.112) [0.008]	-.268 (.154) [.086]	-.211 (.159) [.196]
% change in doctors per cap.	.362 (.137) [.010]	.178 (.172) [0.306]	-.362 (.199) [0.080]	.201 (.114) [.083]	.233 (.152) [0.131]	.057 (.203) [0.780]	-.226 (.208) [.281]	-.249 (.256) [0.333]	-.517 (.423) [0.232]	.091 (.142) [.522]	.103 (.199) [.607]	-.050 (.248) [.842]
% change in saving rate	–	.263 (.143) [0.070]	.508 (.158) [0.004]	–	-.063 (.170) [0.712]	.076 (.195) [0.701]	–	-.011 (.206) [0.956]	-.141 (.214) [0.514]	–	-.035 (.163) [0.830]	.032 (.209) [0.879]
% change in per capita alcohol sales	–	–	.148 (.091) [0.113]	–	–	.098 (.084) [0.250]	–	–	-.090 (.130) [.494]	–	–	-.119 (.090) [.199]
Adj. R2	0.209	0.220	0.354	0.209	0.158	0.236	0.201	0.143	0.215	0.169	0.095	0.268
N	70	69	33	70	69	33	70	69	33	70	69	33

Note: Robust standard errors in parentheses; p-values in brackets. Regressions are weighted by average population in each region over the period.

Table 8. Correlation between changes in age-specific death rates and other variables, 1959 - 1979, rural population

	DV: % change in death rate by age group, men						DV: % change in death rate by age group, women					
	Age 30-34			Age 40-44			Age 30-34			Age 40-44		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
% change in average monthly wage	.164 (.270) [0.547]	.127 (.235) [0.592]	-.303 (.437) [0.495]	-.132 (.278) [0.637]	-.265 (.237) [0.268]	-.538 (.297) [0.082]	-.723 (.413) [0.085]	-1.29 (.345) [0.000]	-1.68 (.649) [0.016]	-.718 (.225) [0.002]	-.847 (.239) [0.001]	-1.20 (.391) [0.005]
% change in share of pop. with higher ed.	-.591 (.203) [0.005]	-.645 (.252) [0.013]	-.577 (.275) [0.046]	-.372 (.189) [0.054]	-.563 (.199) [0.006]	-.458 (.272) [0.105]	.471 (.564) [0.407]	.834 (.478) [0.086]	.947 (.702) [0.190]	.177 (.329) [0.593]	-.259 (.330) [0.435]	.357 (.430) [0.414]
% change in divorce rate	.005 (.217) [0.980]	.021 (.225) [0.924]	-.091 (.295) [0.761]	-.171 (.168) [0.311]	-.113 (.155) [0.469]	-.197 (.202) [0.340]	.032 (.320) [0.921]	.043 (.291) [0.884]	-.010 (.403) [0.980]	.051 (.147) [0.729]	.054 (.143) [.709]	.104 (.192) [.591]
% change in doctors per cap.	.406 (.201) [.048]	.476 (.224) [0.038]	.318 (.315) [0.322]	.084 (.176) [.637]	.333 (.182) [0.072]	.339 (.252) [0.190]	.480 (.392) [.225]	1.09 (.359) [0.004]	1.32 (.577) [0.031]	-.056 (.238) [.813]	.081 (.242) [.740]	-.106 (.343) [.760]
% change in saving rate	–	-.198 (.359) [0.584]	-.303 (.471) [0.526]	–	-.713 (.256) [0.007]	-.769 (.407) [0.071]	–	-1.66 (.369) [0.000]	-2.06 (.665) [0.005]	–	-.376 (.265) [0.161]	-.606 (.427) [0.168]
% change in per capita alcohol sales	–	–	-.078 (.216) [0.721]	–	–	-.141 (.115) [0.223]	–	–	.093 (.278) [.742]	–	–	-.117 (.195) [.556]
Adj. R2	0.254	0.259	0.217	0.171	0.269	0.294	0.079	0.250	0.339	0.082	0.110	0.234
N	68	68	32	68	68	32	68	68	32	68	68	32

Note: Robust standard errors in parentheses; p-values in brackets. Regressions are weighted by average population in each region over the period.