

RECENT MORTALITY EXPERIENCE
IN THE SOVIET UNION—ACTUARIAL NOTE

ROBERT J. MYERS

ABSTRACT

The Soviet Union recently released complete life tables for 1984–85. This paper compares the data in these life tables with those in the 1958–59 U.S.S.R. life tables and with those in U.S.A. life tables for comparable periods. The general conclusions are as follows:

1. U.S.S.R. mortality decreased significantly over the 26 years at the younger ages, but increased at all the older ages; the increase was much greater for males than for females. At the same time, U.S.A. mortality decreased for both sexes at all ages.
2. In the earlier period, U.S.S.R. mortality rates were higher than U.S.A. rates until the middle ages, but lower thereafter. However, in the later period, U.S.S.R. rates were higher at all ages.
3. In both nations, female mortality rates were significantly lower than those for males. The differentials by sex did not change greatly in the U.S.A. between the two periods, but they widened in the U.S.S.R.

The Soviet Union recently released official complete life tables for 1984–85, showing values for single ages up through age 85 [5]. Also available are such tables for 1958–59. This paper analyzes these data, both by comparison over the 26-year period between themselves and as against comparable data for the U.S.A. [3], [4].

The analysis is based entirely on the data as published and does not attempt to draw any political, social, or economic conclusions. Further, the data are taken at face value, without considering whether they have been adjusted from the actual raw experience for smoothing or other purposes.

Table 1 presents the U.S.A. and U.S.S.R. mortality rates (deaths in a year per thousand persons aged x exposed at the beginning of the year) and expectations of life (average years lived in the future by persons aged x , assuming that the mortality rates by age for the given period remain unchanged in the future). Data are given not only for decennial ages but also for age 1, because of the sharp decrease in the mortality rate between ages

0 and 1. In general, following such a sharp decrease, small decreases occur age by age until a minimum is reached at about age 10, and then ever-larger increases occur age by age during the remainder of life.

TABLE 1
MORTALITY RATES AND EXPECTATIONS OF LIFE
IN U.S.A. AND U.S.S.R. FOR SELECTED PERIODS*

AGE	FEMALES				MALES			
	Mortality Rate		Expectation of Life		Mortality Rate		Expectation of Life	
	U.S.A.	U.S.S.R.	U.S.A.	U.S.S.R.	U.S.A.	U.S.S.R.	U.S.A.	U.S.S.R.
For Period around 1960*								
0	22.56	36.77	73.24	71.68	29.13	44.24	66.80	64.42
1	1.58	8.27	73.93	73.40	1.81	8.52	67.80	66.39
10	0.30	0.70	65.35	65.87	0.44	1.03	59.27	58.85
20	0.64	1.17	55.60	56.37	1.69	2.05	49.77	49.53
30	1.06	1.60	46.00	47.07	1.81	3.28	40.56	40.71
40	2.30	2.59	36.61	37.89	3.73	5.19	31.42	32.16
50	5.41	4.74	27.71	28.99	10.14	10.04	23.02	24.05
60	12.09	10.28	19.52	20.64	23.50	22.22	15.94	17.02
70	29.29	27.93	12.37	13.35	49.36	44.04	10.33	11.28
80	81.44	75.00	6.72	8.04	105.98	92.53	5.95	6.93
85	134.23	111.17	4.71	6.35	157.68	132.88	4.39	5.39
For Period around 1984*								
0	9.64	22.57	78.2	72.73	11.91	29.01	71.2	62.87
1	0.63	6.04	78.0	73.40	0.77	6.61	71.1	63.74
10	0.16	0.37	69.2	65.29	0.21	0.63	62.3	55.66
20	0.53	0.69	59.4	55.55	1.54	1.96	52.7	46.12
30	0.68	1.06	49.7	45.96	1.74	3.81	43.5	37.25
40	1.46	2.28	40.1	36.58	2.76	7.08	34.3	28.86
50	3.80	5.06	30.9	27.64	6.85	14.09	25.6	21.29
60	9.38	10.94	22.5	19.40	17.46	28.71	17.9	14.79
70	21.55	30.73	15.0	12.14	39.50	56.91	11.6	9.58
80	53.76	83.68	8.9	6.72	88.57	116.72	6.9	5.66
85	97.11	135.07	6.5	4.75	133.41	167.33	5.2	4.21

*Periods are 1959-61 and 1984 for U.S.A. and 1958-59 and 1984-85 for U.S.S.R.

Table 2 shows, for the U.S.S.R. and the U.S.A. separately, the changes in mortality rates and expectations of life that have occurred in the period. For females, mortality rates decreased significantly and to about the same extent, relatively, for both countries at the younger ages (30 and under); however, at ages 50 and over, the rates for the U.S.S.R. were about 10 percent higher for the recent period than for the earlier period, whereas for the U.S.A. an improvement of about 30 percent had taken place. As a result, in the U.S.S.R. the female expectation of life at birth, as well as at the other

younger ages, was little changed over the years considered, but was significantly lower at the older ages—by 9 percent at age 70 and 25 percent at age 85. (Note that an earlier study [1] showed that the U.S.S.R. expectation of life had increased significantly in the 30 years preceding 1955, but that U.S.S.R. mortality was, nonetheless, higher than that in the U.S.A.)

TABLE 2
MORTALITY RATES AND EXPECTATIONS OF LIFE IN RECENT PERIOD
AS PERCENTAGES OF THOSE IN EARLIER PERIOD FOR U.S.A. AND U.S.S.R.*

AGE	FEMALES				MALES			
	Mortality Rate		Expectation of Life		Mortality Rate		Expectation of Life	
	U.S.A.	U.S.S.R.	U.S.A.	U.S.S.R.	U.S.A.	U.S.S.R.	U.S.A.	U.S.S.R.
0	43%	61%	107%	101%	41%	66%	107%	98%
1	40	73	106	100	43	78	105	95
10	53	53	106	99	48	61	105	95
20	83	59	107	99	91	96	106	93
30	64	66	108	98	96	116	107	92
40	63	88	110	97	74	136	109	90
50	70	107	112	95	68	140	111	89
60	78	106	115	94	74	129	112	87
70	74	110	121	91	80	129	112	85
80	66	112	132	84	84	126	116	82
85	72	121	138	75	85	126	118	78

*Recent period is 1984 for U.S.A. and 1984-85 for U.S.S.R., and earlier period is 1959-61 for U.S.A. and 1958-59 for U.S.S.R.

On the other hand, for U.S. females, the expectation of life increased over the period at all ages—by about 7 percent at the younger ages and increasingly more at the middle and older ages, to more than 30 percent at ages 80 and above.

The trends of changes in mortality rates and expectations of life for males were similar to those for females, although showing somewhat less improvement. This was particularly noticeable for the U.S.S.R., where mortality rates actually increased during the period at ages beyond age 20, with the rise being about 30 percent at ages 40 and over. As a result, the expectation of life in the U.S.S.R. for the recent period was lower at all ages than in the earlier period, with the differential increasing from 2 percent at age 0 to 15 percent or more at ages 70 and above.

Table 3 compares the mortality rates and expectations of life in the U.S.A. with those in the U.S.S.R. in both the earlier and recent periods. In the earlier period, U.S.A. mortality rates were lower than those in the U.S.S.R. until about age 50, but were higher thereafter, with the differential being

about 15 percent for females and 10 percent for males. (In this connection, note that Myers [2] pointed out that U.S.S.R. mortality in the mid-1950s was unusually low at ages 70 and above, compared with Norway—then probably the country with the lowest overall experience—despite being twice as high at ages up to 40.)

TABLE 3
MORTALITY RATES AND EXPECTATIONS OF LIFE IN U.S.A.
AS PERCENTAGES OF THOSE IN U.S.S.R. FOR SELECTED PERIODS*

AGE	MORTALITY RATE		EXPECTATION OF LIFE	
	Females	Males	Females	Males
For Period around 1960*				
0	61%	66%	102%	104%
1	19	21	101	102
10	43	43	99	101
20	55	82	99	101
30	66	55	98	100
40	89	72	97	98
50	114	101	96	96
60	118	106	95	94
70	105	112	93	92
80	109	115	84	86
85	121	119	74	81
For Period around 1984*				
0	43%	41%	108%	113%
1	10	12	106	112
10	43	33	106	112
20	77	79	107	114
30	64	46	108	117
40	64	39	110	119
50	75	49	112	120
60	86	61	116	121
70	70	69	124	121
80	64	76	132	122
85	72	80	137	124

*Periods are 1959-61 and 1984 for U.S.A. and 1958-59 and 1984-85 for U.S.S.R.

At many of the younger ages, the U.S.A. mortality rates in the earlier period were 35-50 percent lower than the Soviet rates—as much as 80 percent lower at age 1, where the U.S.S.R. rate is unusually high. In the recent period, the U.S.A. mortality rates were lower than the Soviet rates at all ages, with the ratios being roughly 75 percent for females at ages 20 and above and 60 percent for males, except at the highest ages (then, about 80 percent). Note, however, the even lower ratios at age 1 in the recent period than those in the earlier period.

In the earlier period, the expectation of life at birth for the U.S.A. was slightly higher than that for the U.S.S.R. for both females and males, but the reverse was the case after the youngest ages—and then increasingly so (by age 60, the expectation of life for the U.S.S.R. was about 5 percent higher than that for the U.S.A.). However, in the recent period, the expectation of life at birth in the U.S.A. was 8 percent higher for females and 13 percent higher for males; this differential slowly increased with attained age, and at the oldest ages it was about 30 percent for females and 20 percent for males.

In Table 4 the data for the two countries are compared in another way—by sex within each nation. In the earlier period, female mortality rates in both countries were about 50 percent of the male rates at ages 20 to 60, but for both the younger and older ages the ratios were higher, generally being about 80 percent. The same U-shaped curves occurred for males in the recent period, with the trough again being about 50 percent for the U.S.A., but only about 35 percent for the U.S.S.R.

TABLE 4
FEMALE MORTALITY RATES AND EXPECTATIONS OF LIFE AS PERCENTAGES
OF THOSE FOR MALES IN U.S.A. AND U.S.S.R. FOR SELECTED PERIODS*

AGE	MORTALITY RATE		EXPECTATION OF LIFE	
	U.S.A.	U.S.S.R.	U.S.A.	U.S.S.R.
For Period around 1960*				
0	77%	83%	110%	111%
1	87	97	109	111
10	68	68	110	112
20	36	57	112	114
30	59	49	113	116
40	62	50	117	118
50	53	47	120	121
60	51	46	122	121
70	59	63	120	118
80	77	81	113	116
85	85	84	107	118
For Period around 1984*				
0	81%	78%	110%	116%
1	82	91	110	115
10	76	59	111	117
20	34	35	113	120
30	39	28	114	123
40	53	32	117	127
50	55	36	121	130
60	54	38	126	131
70	55	54	129	127
80	61	72	129	119
85	73	81	125	113

*Periods are 1959-61 and 1984 for U.S.A. and 1958-59 and 1984-85 for U.S.S.R.

The female/male differential in expectation of life in the earlier period increased slowly for both countries, from about 10 percent at the youngest ages to about 20 percent at ages 60 and beyond. The same trend in this differential for the U.S.A. also occurred for the recent period, although the ultimate level was somewhat higher (about 25 percent). However, for the U.S.S.R. for the current period, the differential started higher (about 15 percent) and rose to a level of about 30 percent at ages 50 and over (the lower figures at ages 80 and 85—as for the U.S.A. in the earlier period—not being very significant).

In summary, the analysis of the mortality experience of the U.S.S.R. in periods around 1960 and 1985 indicates the following salient features:

1. U.S.S.R. mortality decreased significantly over the 26 years at the younger ages (under 45 for females and under 25 for males), but increased at all older ages (much greater for males than for females). On the other hand, U.S.A. mortality decreased for both sexes at all ages, with the largest relative declines at ages 10 and under.

2. U.S.S.R. mortality rates in the earlier period were higher than the U.S.A. rates until the middle ages (45 for females and 50 for males), but significantly lower thereafter (by about 15 percent). On the other hand, in the recent period, U.S.S.R. rates were higher at all ages for both sexes (with the differential being generally no less than 20 percent and often 100 percent or more); particularly at ages 0 and 1 is the difference large—the U.S.S.R. rates for both sexes being $2\frac{1}{2}$ times as high at age 0 and 10 times at age 1.

3. In both nations, females have significantly lower mortality than males at all ages. In the younger and middle adult ages, male mortality in the U.S.S.R. in the earlier period and in the U.S.A. in both periods was generally twice as high as female mortality (in the recent period, the U.S.S.R. differential was threefold).

REFERENCES

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4. "United States Life Tables: 1959-61," Vol. I, No. 1. Washington, D.C.: U.S. Department of Health, Education, and Welfare, December 1964.
5. *Vestnik Statistiki*, 1987, no. 3. Moskva: Gosstatizdat 'T' SSU SSSR.

DISCUSSION OF PRECEDING PAPER

BRUCE D. SCHOBEL:

Mr. Myers' paper, though brief, provides some very interesting comparisons of mortality experience in the U.S.S.R. and the U.S.A., both recently and in the past. Actuaries who are involved in international work are always searching for comparative data, and this paper will be added to the list of references.

One statement in the paper may be a cause of some concern. As stated in the second paragraph, "The analysis is based entirely on the data as published. . . [and] taken at face value. . . ." The author was not able to verify the data, of course, and therefore used what was available, with an appropriate warning. However, the reliability of data from the U.S.S.R. may not be as good as that of data from the U.S.A.

The U.S.S.R. suffered tremendous destruction, especially of its populated areas, during World War II. Many vital statistics records were destroyed, making the ages of many persons born before the war almost impossible to verify. Moreover, the U.S.S.R. has always had remote mountain regions where people claim to live well over 100 years, even close to 150 years!

The numbers of people claiming to have attained these extremely advanced ages may not be very large, but they may be large enough to influence the mortality data to some extent. Moreover, the apparent overstatements of age may be a more general problem in the U.S.S.R., where, as noted, vital statistics records may be missing or destroyed.

The demographers who prepared the life tables for the U.S.S.R. may or may not have tried to make adjustments for inaccurate reporting of ages. If Mr. Myers has any information about such adjustments, or information in general about the quality of mortality data from the U.S.S.R., he should share it with his readers. Then we can draw our own conclusions about the reliability of the data presented.

(AUTHOR'S REVIEW OF DISCUSSION)

ROBERT J. MYERS:

Mr. Schobel has an excellent point with regard to whether any adjustments were made by the Soviet demographers to take into account likely overstatements of age, especially at the advanced ages. However, I am unable to answer his questions because I do not have available any description of how

the life tables were produced from the raw data—or even who developed them.

I would like to add a point in connection with the relationship of U.S.S.R. and U.S.A. mortality for the period around 1984. Table 3 had shown that the ratio of the U.S.A. mortality rate to that for the U.S.S.R. was about 42 percent at age 0, 11 percent at age 1, and 35–45 percent at age 10, for each sex considered separately. It is interesting to observe that this ratio was about 25 percent at age 2 and 35–45 percent at each age from 3 to 9 (or the same as at age 10).