Standardization of the crude birth and death rates of the U.S.S.R. indicates that, contrary to the claims, Soviet mortality is higher than that of the United States and its fertility is lower.

Analysis of Mortality and Fertility Data of the Soviet Union

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BOTH MORTALITY and fertility are sometimes measured by so-called crude rates. The crude death rate is merely the number of deaths in a year divided by the average total population during the year (or the total population in the middle of the year). Similarly, the crude birth rate is based on the total number of births in the year and the total population. Analysis of these crude rates possesses a certain significance if confined to a single country over a period of a few years, but even here there are certain limitations and dangers. Even greater difficulties, and in some instances insurmountable ones, arise if international comparisons are made. The main reason is the difference in age structures of the basic populations, either in the same country at different times or in different countries.

The following extreme example of the effect of age structure on the crude death rate is indicative of the weakness of this measure for analytic purposes. Consider town A, consisting primarily of a large university, with accompanying service facilities. It would naturally be expected that this town would have a very low crude death rate because most of its residents are young students. On the other hand, consider town B, which because of its favorable warm climate is a haven for retired persons. This town would obviously show a relatively high crude death rate, one much higher than town A, despite the fact that it might be the "healthier" place in which to live if the population structures were the same.

This paper examines and analyzes the available data on mortality and fertility in the U.S.S.R. In recent years, the data that have been released have been extremely limited. They include only such items as crude birth and death rates, total population, and expectation of life at birth. There are no figures by age for the population or for deaths, births, or expectation of life.

The Soviet Union frequently lays great emphasis on its crude birth and death rates. For instance, its first report on the 1959 census stated that the death rate is the lowest in the world (*1*). This statement has also been made a number of other times about previously published crude rate figures, despite the fact that the U.S.S.R. has released figures for the expectation of life at birth for recent years that are some 6 percent lower than those of the United States. Similarly, on the basis of crude birth rates, the U.S.S.R. claims a high fertility rate.

World Comparisons of Death Rates

Before analyzing the effect of standardizing the U.S.S.R.'s mortality rates, let us see whether

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the reported crude death rate of the Soviet Union is the lowest in the world. The figure was 7.7 per 1,000 for 1956, which was definitely below the corresponding figure for the other major industrially developed countries in the world, such as Australia, Canada, New Zealand, the United States, and the Western European nations, most of which had crude death rates of from 8 to 12 per 1,000 (*2a*). On the other hand, there were a number of countries that had lower crude death rates than the Soviet Union: Greece (7.4), Iceland (7.2), Iran (6.8), Israel (6.6), Lebanon (5.5), Peru (6.8), Syria (5.4), and Uruguay (7.0). Many of these countries are not particularly noted for their favorable health or economic conditions. Probably the reason for the low crude death rates of these countries lies in the dual circumstances of a relatively young age distribution and the very significant postwar reductions in certain communicable diseases. Also, in some of these countries the accuracy of reporting of deaths and enumeration (or estimate) of the population may be questioned.

In 1956 certain outlying U.S. possessions and territories had lower crude death rates than the U.S.S.R.: Alaska (5.8), Guam (6.6), Hawaii (5.8), Puerto Rico (7.0), and Samoa (7.4). A number of small possessions of European nations, such as Angola, Cyprus, Fiji Islands, and Sarawak, also had very low crude death rates.

Trends in Crude Death Rates

The only official Soviet data on mortality for the last 30 years are crude death rates and infant mortality rates. Eliminating periods of war and civil strife, the decline in the crude death rate has been striking, from 30.2 per 1,000 in 1913 to 20.3 per 1,000 in 1926, to 18.3 per 1,000 in 1940, and then to 9.6 per 1,000 in 1950, followed by a steady decline each year thereafter to 7.7 per 1,000 in 1956 (*3a*). These figures are indicative, to a certain extent at least, of a real improvement, but how much the decline in mortality is due to improved health and how much to changes in age structure is a question.

Similar declines in the crude death rate occurred in other countries that had relatively high levels of mortality before World War II. In Japan, for example, the crude death rate was 19.4 per 1,000 in 1913 and 19.2 per 1,000 in 1926, and declined to 16.2 per 1,000 in 1940, to 10.9 per 1,000 in 1950, and then to 8.0 per 1,000 in 1956 (*2a*, *4*). Thus, the trend of the crude death rate in the period immediately preceding World War II and thereafter has been very similar in Japan and in the U.S.S.R.

The United States had a much lower level of mortality before World War II than the U.S.S.R. or Japan. Accordingly, although there was a significant improvement in mortality in the past half century in the United States, the crude death rate had a much smaller decrease than in many other countries. Thus, the U.S. crude death rate was about 14 per 1,000 in 1915. Over the next 40 years, in general, it declined gradually to a level of 9.6 per 1,000 in 1956. The actual improvement in health conditions was even greater than this because the age structure of the population shifted to a much older age distribution.

Standardization of U.S.S.R. Mortality Data

No recent information on deaths in the Soviet Union by age and sex is available. Without such data the only possible method of analyzing mortality experience is by standardization. The results achieved are not too informative, since it is desirable to analyze the experience by age and by sex in order to determine the true significance of any changes. But, in the absence of complete data, the standardization procedure is certainly better than no analysis at all.

The method of standardization requires that the age distribution of the population be available even though that for deaths is not. The Soviet Union has not released figures about the age distribution of the population since the 1939 census. However, detailed estimates for 1956 have been prepared by the U.S. Bureau of the Census (*5*) and also by an eminent French demographer (*6*). Although the two sets of figures differ somewhat, the resulting standardized death rates (and birth rates) differ by less than 3 percent.

The method of standardization is to apply the age-specific mortality rates, separately by sex,

of a given standard to the age-sex distribution of the particular population under study. The deaths "expected" on the basis of the mortality standard can then be obtained. The standardized crude death rate can be computed for these "expected" deaths and then compared with the actual crude rate. The comparison indicates the relative level of the actual mortality of the population as against that of the mortality standard.

For analysis of the mortality experience of the U.S.S.R. in 1956, the actual experience of the United States in the same year is used as the mortality standard (*7a*). (Rates for the age group 0–4 years were modified because of the theoretical consideration that the number of births each year in the past 5 years in the United States would not necessarily have the same pattern as in the U.S.S.R. The difference, however, has relatively minor effect on the results as a whole.)

Table 1 sets forth the basic data used in the analysis and also the estimate of deaths that would have occurred in the U.S.S.R. population if U.S. mortality had applied. The resulting crude death rate is 6.18 per 1,000 (1,231,300 deaths divided by 199,336,000 population), or 20 percent below the reported U.S.S.R. rate of 7.7 per 1,000. This is a very low crude death rate and is due to the Soviet Union having a very young age distribution. The age-specific U.S. death rates when applied to the U.S. age distribution in 1956, of course, yield the previously mentioned crude death rate of 9.6 per 1,000, 25 percent above the reported Soviet crude rate, but 55 percent above what the Soviet crude rate would have been if that country's age-specific rates had been equal to those of the United States. The relatively young age distribution in the U.S.S.R. may be seen from the fact that only 7.8 percent of its population is aged 60 years and over as against 12.6 percent in the United States in 1956 (and about 20 percent for a stationary life table population based on current U.S. mortality and a constant annual number of births). The relatively low crude death rate currently reported by the U.S.S.R. is thus clearly due in considerable part to its relatively young age distribution.

Calculations standardizing mortality similar to those in table 1 have also been made for the U.S.S.R. for the officially reported age-sex dis-

Table 1. Application of U.S. mortality rates to U.S.S.R. population, Jan. 1, 1956

[Population and deaths in thousands; rates per thousand]

Age group (years)	U.S.S.R. population [1]		U.S. 1956 mortality rates [2]		Estimated U.S.S.R. deaths	
	Male	Female	Male	Female	Male	Female
0–4	11,901	11,380	7.0	5.4	83.3	61.5
5–9	9,253	8,906	.5	.4	4.6	3.6
10–14	7,975	7,685	.6	.3	4.8	2.3
15–19	11,085	10,653	1.3	.6	14.4	6.4
20–24	8,299	8,057	2.0	.7	16.6	5.6
25–29	10,244	10,096	1.8	.9	18.4	9.1
30–34	7,198	8,573	2.1	1.2	15.1	10.3
35–39	4,141	6,359	2.9	1.9	12.0	12.1
40–44	4,643	7,452	4.6	2.8	21.4	20.9
45–49	4,987	6,918	7.6	4.3	37.9	29.7
50–54	4,628	5,870	12.0	6.4	55.5	37.6
55–59	3,378	4,449	18.6	9.8	62.8	43.6
60–64	2,314	3,097	28.4	15.1	65.7	46.8
65–69	1,710	2,540	42.6	25.3	72.8	64.3
70–74	1,119	1,690	59.6	38.2	66.7	64.6
75–79	635	1,046	86.2	62.0	54.7	64.9
80–84	285	536	134.4	109.7	38.3	58.8
85 and over	92	142	193.9	186.2	17.8	26.4
Total	93,887	105,449			662.8	568.5

[1] Reference 5. Subdivision of data for ages 70 years and over from unpublished data of the U.S. Bureau of the Census.

[2] Reference 7a, except that rates for age group 0–4 years are based on values obtained from abridged life tables (with weighting by relative proportions of white and nonwhite populations in this age group).

tribution of the population in 1926 and for the estimated age-sex distribution in 1939. The estimate for 1939, prepared by Michael K. Roof, Legislative Reference Service, Library of Congress, is based on the officially reported census distribution by broad age groups (under 7, 8–11, 12–14, 15–19, decennial age groups up to 60, and 60 and over), supplemented by sex breakdowns from literacy data and by projections to 1939 of the 1926 census data and of data on subsequent births.

The mortality standards used for the 1926 and 1939 population distributions are the actual age-specific death rates, by sex, for the United States for the same years. For 1926, the U.S. age-specific death rates are available only for certain age groups (under 1, 1–4, decennial age groups up to 85, and 85 and over); therefore, the Soviet census data were grouped accordingly. For 1939, the U.S. age-specific death rates are available for the following age groups (unpublished data from the National Office of Vital Statistics): under 1, 1–4, quinquennial age groups up to 85, and 85 and over. The estimated Soviet age distribution for 1939 is available in similar groups except that ages 70 and over are combined, but breakdown into quinquennial groups has been made by assuming that the proportionate distribution of the population aged 70 and over in 1939 was the same as in 1926.

The resulting standardized crude death rates are compared with the reported crude death rates of the U.S.S.R. for closely corresponding periods in the following table:

Year	*Crude death rate*	*Standardized death rate*	*Excess of crude over standardized rate (percent)*
1926	20.3	11.87	71
1940	18.3	8.71	110
1956	7.7	6.18	25

The excess of the reported U.S.S.R. crude death rate over the standardized crude death rate based on U.S. experience has decreased very significantly in the past three decades, although immediately before World War II it was more than 100 percent and it still amounts to 25 percent. This change would seem to indicate that there has been a very significant improvement in mortality in the Soviet Union in recent years, according to the reported crude death rates.

U.S.S.R. Data on Life Expectancy

Although no Soviet data on mortality experience by age have been released in the past three decades, figures have been published as to the expectation of life at birth (*3b*, *8*). These, along with corresponding figures for the United States (*9a*), are as follows:

Period	*All persons*		*Males*		*Females*	
	U.S.S.R.	*U.S.*	*U.S.S.R.*	*U.S.*	*U.S.S.R.*	*U.S.*
1926–27	44	58.6	42	57.2	47	60.0
1954–55	64	69.6	61	66.7	67	72.9
1955–56	67	69.6	63	66.7	69	73.0

The reported improvement in the expectation of life at birth in the U.S.S.R. in the last three decades is very significant. Although the U.S.S.R. rate of improvement has been greater than that of the United States, the latter still shows a significantly higher expectation, by 3.7 years for males and 4.0 years for females. Interestingly, the difference is only 2.6 years for both sexes combined, which is the result, in large part, of the higher proportion of women in the U.S.S.R. than in the United States (the 1956 sex ratios of the total population were 887 and 984 men per 1,000 women, respectively). This comparison demonstrates why it is desirable to consider mortality experiences separately by sex.

The data on expectation of life at birth in the U.S.S.R. for 1955–56 can be analyzed, to a certain extent, on the basis of the standardization analysis previously made. This indicated that, in the aggregate, Soviet mortality in 1956, when standardized by age and sex, was 24.6 percent higher than U.S. mortality for the same period. It may first be assumed that this difference applies at each age, although this is almost certainly not the case. Since the infant mortality rate in the Soviet Union was reported as 47 per 1,000 in 1956 (*10*), or about 80 percent higher than that of the United States for the same year, another possible approach is to assume a graded differential that is about 80 percent at age 0 and that decreases

thereafter in such manner as to give age-specific mortality rates that reproduce exactly the Soviet crude rate of 7.7 per 1,000 when they are applied to the 1956 age-sex distribution.

The age-specific mortality rates shown by U.S. experience were uniformly increased by 24.6 percent for the first assumption; for the second assumption, by 78 percent for age 0, 77 percent for age 1 year, decreasing by 1 percent for each year until there is no differential for ages 78 years and over. This latter treatment produced a crude death rate of 7.72 per 1,000 for the 1956 age-sex distribution and was adopted because of its simplicity (rather than beginning at 80 percent at age 0 and then working down to a zero differential in a more complex fashion). The U.S. age-specific mortality rates were developed from the complete life tables for 1956 prepared by the Metropolitan Life Insurance Co. from the official abridged life tables for 1956 (*9b*), which are for all persons and for each sex by race. The author developed therefrom corresponding tables for all males and all females, using also the official abridged tables for these two categories (unpublished data from the National Office of Vital Statistics).

The expectations of life at birth were then computed from the life tables developed from such age-specific rates. The results of these computations of expectation of life at birth for 1956 are shown in the following table, in comparison with the reported Soviet data for 1955–56:

Category	Reported figures	Computed figures	
		Constant differential	Decreasing differential
All persons	67	66.5	65.7
Males	63	63.3	62.3
Females	69	70.0	69.5

The male and female figures obtained by assuming a constant mortality differential with age between U.S.S.R. and U.S. experience are actually somewhat above the reported values. However, the male and female figures based on a decreasing differential (starting higher and ending lower), which are probably the more logical, are reasonably close to the reported values. The reported figure for both sexes combined is higher than the two computed values, but this has no significance because of the excess female population in comparison with what would be expected in a life table population.

Trends in Crude Birth Rates

Soviet data on fertility are as sparse as they are for mortality. The only official figures available are crude birth rates, the trend of which has been just as strikingly downward as that of the reported death rates. Thus, the reported crude birth rate was around 45 per 1,000 in both 1913 and 1926 and fell to 32 per 1,000 in 1940. In the 1950's, this rate has been relatively level at 25 to 27 per 1,000, with the 1956 figure being 25.0 (*3a*).

The trend and level of the crude birth rate in most of the industrialized and well-developed countries in the past half century (*2b*) have been somewhat different from the pattern in the U.S.S.R. In general, there was a steady decline until about 1940. In the 1950's, in most countries, the level has been definitely higher than that in the 1930's. However, in some countries (for example, Austria, Denmark, the Netherlands, and the United Kingdom) the level is about the same as in the 1930's and in a few, primarily in the Mediterranean area, the current level is lower than in the 1930's, just as in the U.S.S.R.

In the United States, the crude birth rate dropped from about 30 per 1,000 in the 1910's to a low of about 19 in the 1930's. Since World War II it has been about 25 per 1,000. In most of the Western European countries, the crude birth rate has been somewhat lower than in the United States, but with the same general trend; currently, the rates in these countries are about 16 to 22 per 1,000. Canada, too, has had about the same trend in the crude birth rate as the United States, but the level has generally been about 10 percent higher. In Japan, which has had somewhat the same trend in the crude death rate as the Soviet Union, the crude birth rate has displayed an entirely different trend from that of the U.S.S.R. (or for that matter, different from that in any other major country). The rate was level at about

33 per 1,000 from the turn of the century to the beginning of World War II and for a few years thereafter (*4*), but then it declined sharply to about 18 per 1,000 in 1956.

The current level of the Soviet crude birth rate is thus relatively high as compared with that of other major industrialized countries, although not high in comparison with many of the underdeveloped countries, which have rates as high as 40 to 50 per 1,000. But this high crude rate is not necessarily an indication of high fertility in the U.S.S.R.

Standardization of U.S.S.R. Fertility Data

Just as mortality is sometimes erroneously measured by the crude death rate, it is not uncommon to see measurement of fertility attempted through the use of the crude birth rate. Here, too, proper analysis requires at least age-specific fertility rates (births to mothers of a given age, divided by total women in the population in that age group), and more adequate analysis can be made if consideration is given also to marital status and birth order.

When, however, data on births by age of mother are not available, but rather only the total female population by age groups is at hand, the only possible analytical procedure is standardization. If data were available by marital status and birth order, further standardization could be done. But, in any event, standardization by age is of some significance.

The method of standardization of crude birth rates is the same as described for crude death rates, except that only the female population is considered.

Actual experience of the United States in 1956 has again been used as the standard (*7b*). The basic data of this analysis and also the estimated births that would have occurred in the U.S.S.R. population if U.S. fertility had applied are shown in table 2. The resulting crude birth rate is 32.69 per 1,000 (6,516,400 births divided by 199,336,000 population), or 31 percent above the reported U.S.S.R. rate of 25.0 per 1,000. The relatively young age distribution of the U.S.S.R. population is clearly responsible, in considerable part, for the moderately high crude birth rate currently reported by that country. It may also be inferred that, on the whole, fertility in the Soviet Union is 24 percent lower than in the United States.

Table 2. Application of U.S. fertility rates to U.S.S.R. population, Jan. 1, 1956

[Population and births in thousands; rates per thousand]

Age group (years)	U.S.S.R. female population [1]	U.S. 1956 fertility rates [2]	Estimated U.S.S.R. births
10–14	7,685	1.0	7.7
15–19	10,653	94.2	1,003.5
20–24	8,057	251.3	2,024.7
25–29	10,096	195.5	1,973.8
30–34	8,573	116.4	997.9
35–39	6,359	60.3	383.4
40–44	7,452	15.9	118.5
45–49	6,918	1.0	6.9
Total	65,793		6,516.4

[1] Reference 5.
[2] Reference 7b.

U.S.S.R. Fertility and Family Allowances

Another indication of the level of U.S.S.R. fertility may be found in data from the country's family allowance program. Under this program, monthly payments are made to children aged 1 through 4 years who are of fourth or higher order of birth, the amount varying according to the birth order. At the end of 1956, 3,312,000 children were reported to be receiving such allowances, representing 17.9 percent of children in the country aged 1–4 years, as estimated by the author on the basis of data on total population and births presented by Biraben (*6*). The corresponding figures for the end of 1950 were 3,079,000 children receiving allowances, representing 19.2 percent of the children aged 1–4 years.

Although census data on children by birth order are not available for the United States, adequate and proper analysis can be made by considering birth-order data reported to the National Office of Vital Statistics. For 1953–56, births of the fourth and higher orders were 25.1 percent of all births in the United States, significantly higher than in the Soviet Union. The following table compares the figures for the two countries, with subdivision by birth

order, showing the ratio of children of a particular birth order to total children:

Birth order	U.S.S.R. (percent)	U.S. (percent)	Ratio U.S. to U.S.S.R. (percent)
4	8.6	11.1	129
5	4.6	5.8	126
6	2.5	3.2	128
7 and higher	2.2	5.0	227
Total	17.9	25.1	140

The higher birth orders in the United States are clearly more prevalent than in the Soviet Union. This finding confirms the results of the other analyses; that is, that fertility is significantly higher in the United States than in the U.S.S.R.

Summary and Conclusions

The Soviet Union frequently makes the claim that its mortality is the lowest in the world, whereas in the past it was extremely high. These statements are made on the basis of the crude death rate, which is currently reported at a relatively low level, for 1956 some 20 percent lower than the United States. However, the Soviet Union has also reported figures for the expectation of life at birth, which, for 1956, are about 4 years lower than for the United States, for both men and women.

Similarly, the only figures available as to fertility are the crude birth rates. On the basis of these, the U.S.S.R. claims a high fertility rate. Actually, in recent years, the Soviet crude birth rate has been well above that of most Western European countries, but virtually the same as for the United States.

This paper has analyzed mortality and fertility in the U.S.S.R. on the basis of standardization by age. This procedure is especially necessary in dealing with data for the Soviet Union because of the unusually young age distribution of the population. The resulting analysis indicates that Soviet mortality as reported, after taking into account age and sex distributions, is about 25 percent higher in the aggregate than that of the United States, while fertility is about 24 percent lower.

Analysis tends to confirm to a considerable extent the reliability of the reported Soviet figures on expectation of life at birth, assuming the accuracy of the reported crude death rates. The differential in life expectancy between the United States and the U.S.S.R., for each sex, currently amounts to about 4 years (in favor of the United States).

Considerable improvement in mortality in the U.S.S.R. has undoubtedly occurred since the pre-World War II period. This same trend, however, has been present in many other countries throughout the world that had relatively high mortality in the past.

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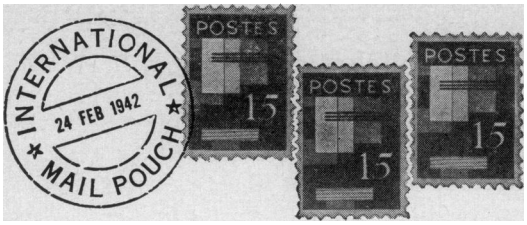

Milk Week

Milk Week for all Ceylon ended on Independence Day, February 4, 1959, with 2,500 school children marching in a parade and pageant in Colombo. Approximately 70,000 people saw a physical education demonstration and floats in Independence Square. Similar demonstrations were held in other parts of the island.

During Milk Week schools held poster competitions and exhibited health and nutrition work. Posters, film shows, radio, and newspaper stories focused public attention on the value of milk and its availability through CARE in the schools.

The celebration was part of a long-range effort to improve nutrition in schools and homes and to encourage use of home and school gardens.

—PHILIP RILEY, *public health education adviser, U.S. Operations Mission, Ceylon.*

Training Medical Students

Quinta Normal Health Center will serve as a demonstration teaching center for medical students and as a demonstration of a comprehensive integrated health program. Chile's National Health Service has assigned a section of the center's building to the Medical School of the University of Chile for carrying out this project of the school's division of preventive medicine and public health.

The medical school will assume responsibility for the health of 2,000 families in one area served by the center. Two pediatricians, an internist, and a psychiatrist from the school; and two pediatricians, an internist, an obstetrician, two nurses, and two social workers from the National Health Service will staff the project.

When a birth occurs in a family living in the area, the mother and child will be given maternal and child health services, and, through them, the rest of the family will be reached. As they provide hospital, outpatient, and home care, medical students will learn about social and economic as well as medical and public health problems. Students are responsible for specific families during their studies in preventive medicine and public health.

—G. HOWARD GOWEN, M.D., *chief, division of preventive medicine and public health, U.S. Operations Mission, Chile.*

Courses for Rural Physicians

Nearly 300 rural physicians have taken postgraduate courses at the Institute of Rural Occupational Medicine and Rural Health in Lublin, Poland. The 3- or 4-week courses were started in 1952 after investigations revealed that rural physicians had inadequate training in sanitary and preventive methods.

The institute offers a course stressing hygiene and prophylaxis, a general clinical course emphasizing traumatology and the more common diseases of the rural environment, a course in laboratory and X-ray techniques, and a course in internal medicine and pediatrics focused on diseases associated with rural living and working conditions.

The institute has planned the curriculum for a fifth course, which deals with epidemiology and the anthropozoonotic diseases, to be offered to physicians and veterinarians, and hopes to start courses for rural nurses and rural health instructors.

Some 300 rural physicians as well as many scientists and specialists in rural health service organizations attend the annual nationwide conference of rural practitioners organized by the institute. Since 1957 the section of rural medicine of the Polish Medical Society has assisted in organizing these conferences.

—DR. Z. KAWECKI, *chief, methods organization section, State Institute of Rural Occupational Medicine and Rural Health, Lublin, Poland.*

Fluoridation

Public water supplies are being fluoridated, as a dental health measure, in Penang (234,000 population), Federation of Malaya, and in the State of Singapore (1,467,000 population). Fluoridation has been approved also for the public water supply of Hong Kong (2,600,000 population).

—DR. A. KARIM, *assistant director of medical services (dental), Ministry of Health, Federation of Malaya.*