# MIGRATION AND SETTLEMENT:
# 8. SOVIET UNION

Svetlana Soboleva
*Institute of Economics and Industrial Engineering*
*of the USSR Academy of Sciences, Novosibirsk*

RR-80-36
November 1980

**INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS**
**Laxenburg, Austria**

*Research Reports*, which record research conducted at IIASA, are independently reviewed before publication. However, the views and opinions they express are not necessarily those of the Institute or the National Member Organizations that support it.

---

## FOREWORD

Interest in human settlement systems and policies has been a central part of urban-related work at the International Institute for Applied Systems Analysis (IIASA) from the outset. From 1975 through 1978 this interest was manifested in the work of the Migration and Settlement Task, which was formally concluded in November 1978. Since then, attention has turned to dissemination of the Task's results and to the conclusion of its comparative study, which, under the leadership of Dr. Frans Willekens, is focusing on a comparative quantitative assessment of recent migration patterns and spatial population dynamics in all of IIASA's 17 National Member Organization countries.

The comparative analysis of national patterns of interregional migration and spatial population growth is being carried out by an international network of scholars who are using methodology and computer programs developed at IIASA.

In this report, Dr. Soboleva examines the spatial population dynamics of the Soviet Union, relating them to historical events and national population policies. Of particular interest are the urban–rural disaggregation and the use of heretofore unavailable Soviet multiregional age-specific demographic data.

Reports summarizing previous work on migration and settlement at IIASA are listed at the end of this report.

*Andrei Rogers*
Chairman
Human Settlements
and Services Area

## ACKNOWLEDGMENTS

The author is grateful to Andrei Rogers and Tatjana Zaslavskaya for advice on the entire paper, to Dimiter Philipov for his generous computational assistance, to Alla Solovjeva for skillfully translating the original manuscript into English, to Maria Rogers for editing it, and to Rosemary Flory for her excellent job of typing.

CONTENTS


| | | |
|---|---|---|
| 1 | INTRODUCTION | 1 |
| 2 | CURRENT PATTERNS OF SPATIAL POPULATION GROWTH | 3 |
| | 2.1 Fertility | 8 |
| | 2.2 Mortality | 14 |
| | 2.3 Migration | 22 |
| | 2.4 Age Composition | 32 |
| 3 | MULTIREGIONAL POPULATION ANALYSIS | 39 |
| | 3.1 Data Preparation | 40 |
| | 3.2 Analysis of Observed Population Characteristics | 42 |
| | 3.3 The Multiregional Life Table | 47 |
| | 3.4 Fertility and Mobility Analysis | 56 |
| | 3.5 Multiregional Population Projection to Stability | 58 |
| 4 | POPULATION POLICY | 67 |
| | 4.1 Fertility and Health Care | 67 |
| | 4.2 Migration | 69 |
| 5 | CONCLUSION | 71 |
| REFERENCES | | 72 |
| FURTHER READING | | 73 |
| APPENDIXES | | |
| | A Age-specific Mortality, Fertility, and Migration Rates, Total Population, 1974 | 77 |
| | B Probabilities of Dying and Migrating, and Expected Number of Survivors at Each Age, Total Population, 1974 | 85 |
| | C Multiregional Population Projections, Total Population, 1984–2024 | 97 |
| | D Single-Region Life Tables, Total Population, 1974 | 107 |

# 1 INTRODUCTION

This work is the result of research carried out within the framework of the Migration and Settlement Task in the Human Settlements and Services Area at IIASA. The goal of the project is a comparative analysis of the spatial dynamics and demographic characteristics (birth, death, and migration rates, and age–sex structure) of the populations of IIASA's member nations.

In accordance with this goal, the present study analyzes the demographic development of regional populations in the USSR and the components of this development, both for the individual regions of the country and for the USSR as a whole. Particular attention is given to an examination of the dynamics of regional population growth and distribution using IIASA's set of multiregional demographic computer programs. The spatial division of the USSR adopted here is based on the division of the country into 15 republics. Data for 1974 are used for estimating the rates of fertility, mortality, and migration, and a 50-year population projection up to the year 2024 is included.

This study draws on the findings of several of the leading Soviet specialists in the field of population: scientists such as Urlanis, Valentei, Ryabushkin, Kvasha, Khorev, Rybakovskii, Kurman, and Vishnevskii.

Before describing the current patterns of spatial population growth, it is important to give a brief historical overview of the development of the population in the Soviet Union.

The USSR has the third largest population in the world, after China and India. On January 1, 1979 it had a total population of 262.4 million people. This number might have been reached much earlier had it not been for the deaths of many millions of people in World War II. More than 20 million people lost their lives during this war, but the country's total loss, including the indirect losses due to higher mortality and reduced fertility, was closer to 50 million. It took 10 postwar years for the nation's population to grow back to its prewar numbers.

TABLE 1 Population of the USSR (in thousands) for the 1920–1979 period.

| Year | Population | | | Percentage | |
|---|---|---|---|---|---|
| | Total | Urban | Rural | Urban | Rural |
| 1920 | 136 810 | 20 855 | 115 925 | 15 | 85 |
| 1926 | 147 028 | 26 314 | 120 714 | 18 | 82 |
| 1939 | 190 678 | 60 409 | 130 269 | 32 | 68 |
| 1940 | 194 352 | 63 100 | 131 252 | 32 | 68 |
| 1950 | 178 547 | 69 414 | 109 133 | 39 | 61 |
| 1955 | 194 415 | 86 261 | 108 154 | 44 | 56 |
| 1960 | 212 372 | 103 618 | 108 754 | 49 | 51 |
| 1961 | 216 286 | 107 883 | 108 403 | 50 | 50 |
| 1962 | 220 003 | 111 244 | 108 759 | 51 | 49 |
| 1963 | 223 457 | 114 365 | 109 092 | 51 | 49 |
| 1964 | 226 669 | 117 720 | 108 949 | 52 | 48 |
| 1965 | 229 628 | 120 730 | 108 898 | 53 | 47 |
| 1966 | 232 243 | 123 720 | 108 523 | 53 | 47 |
| 1967 | 234 823 | 126 910 | 107 913 | 54 | 46 |
| 1968 | 237 165 | 129 758 | 107 407 | 55 | 45 |
| 1969 | 239 468 | 132 893 | 106 575 | 55 | 45 |
| 1970 | 241 720 | 135 991 | 105 729 | 56 | 44 |
| 1971 | 243 873 | 139 025 | 104 848 | 57 | 43 |
| 1972 | 246 293 | 142 537 | 103 756 | 58 | 42 |
| 1973 | 248 625 | 146 099 | 102 526 | 59 | 41 |
| 1974 | 250 869 | 149 589 | 101 280 | 60 | 40 |
| 1975 | 253 261 | 153 110 | 100 151 | 60 | 40 |
| 1979 | 262 442 | 163 600 | 98 800 | 62 | 38 |

SOURCES: Central Statistical Office (1975), p. 7 and *Izvestiya* (April 22, 1979).

The most important changes in the dynamics and distribution of the USSR's population are connected with urbanization. In 1920 the urban population was 15 percent of the total while in 1975 it was 60 percent (Table 1). The average annual rate of increase of the country's urban population (Table 2) has slowed down somewhat during the last 15 years and will continue to decrease as a higher level of urbanization is achieved.

In the postwar years, the urban population has grown, while the rural population has declined. In a period of only 10 years, from 1940 to 1950, the rural population was reduced by 22.2 million. This sharp decline is connected not only with wartime casualties and with the drop in the levels of natural increase, but also with the intensive rural–urban flow of the population. In the following decade, 1950–1960, the comparatively high natural increase of the rural population was counteracted by a high level of out-migration. As a result, the rural population in this period hardly changed in size, whereas the urban population grew by more than 34 million. This pattern did not continue,

TABLE 2 Average annual growth of the urban population in the USSR.

| Period | Annual growth (in millions) | Average annual growth rate (%) |
|---|---|---|
| 1922–1939 | 2.4 | 4.6 |
| 1940–1949 | 0.6 | 0.95 |
| 1950–1959 | 3.4 | 4.1 |
| 1960–1969 | 3.2 | 2.8 |
| 1970–1974 | 3.4 | 2.4 |

SOURCE: Khorev and Moiseyenko (1976).

however. Beginning in the mid-sixties, the growing migration losses were no longer compensated for because of a sharp drop in the rural birth rate. From 1966 to 1975, the rural population declined by 8.3 million while the urban population grew by more than 29 million.

Table 3 presents data on area, urban and rural populations, and population density for each of the 15 union republics in the USSR. There is a large difference both in the area of the republics and in the corresponding sizes and densities of urban and rural populations. For example, in the Estonian Soviet Socialist Republic (SSR) the rural population in 1974 consisted of 32.7 percent of the republic's total population, whereas in the Moldavian SSR the corresponding share was almost twice as large (64.6 percent). In the Uzbek, Kirghiz, and Tadzhik SSRs the rural population was 62 percent of the total.

There also exists a large difference in population densities between union republics. According to 1974 data, in the Turkmen and Kazakh SSRs population density was 5 persons per square kilometer; in the Ukrainian SSR it was 80.4; and in the Moldavian SSR it was 111.7.

The differences in the dynamics of relative changes of population size in the country as a whole and in its republics' urban and rural populations are also substantial (Tables 4–6 and Figure 1). The total population of the RSFSR, the Ukrainian SSR, and the Byelorussian SSR increased by only 13–16 percent between 1959 and 1974, while in the Kirghiz, Turkmen, and Armenian SSRs, it grew by more than 50 percent, and in the Tadzhik and Uzbek SSRs by more than 60 percent. At the same time the rural population declined by 15 percent in the Byelorussian SSR and fell by 20 percent in the RSFSR, but grew by almost 53 percent in the Uzbek, Tadzhik, and Turkmen SSRs.

## 2 CURRENT PATTERNS OF SPATIAL POPULATION GROWTH

Population change is a complex process that is influenced by a wide range of social, economic, demographic, and political factors, which are reflected in the variations in patterns of fertility, mortality, and migration.

TABLE 3 Area, population, and population density of each republic on January 1, 1974.

| Republic | Area ($\times 10^3$ km$^2$) | Population (in thousands) | | | Percentage of total population | | Population density (per km$^2$) |
|---|---|---|---|---|---|---|---|
| | | Total | Urban | Rural | Urban | Rural | |
| RSFSR | 17 075.4 | 132 913 | 88 231 | 44 682 | 66.4 | 33.6 | 7.8 |
| Ukrainian SSR | 603.7 | 48 521 | 28 195 | 20 326 | 58.1 | 41.9 | 80.4 |
| Moldavian SSR | 33.7 | 3 764 | 1 332 | 2 432 | 35.4 | 64.6 | 111.7 |
| Byelorussian SSR | 207.6 | 9 268 | 4 549 | 4 719 | 49.1 | 50.9 | 44.6 |
| Uzbek SSR | 447.4 | 13 289 | 5 030 | 8 259 | 37.9 | 62.1 | 29.7 |
| Kirghiz SSR | 198.5 | 3 219 | 1 228 | 1 991 | 38.1 | 61.9 | 16.2 |
| Tadzhik SSR | 143.1 | 3 283 | 1 242 | 2 041 | 37.8 | 62.2 | 22.9 |
| Turkmen SSR | 488.1 | 2 430 | 1 182 | 1 248 | 48.6 | 51.4 | 5.0 |
| Kazakh SSR | 2 717.3 | 13 928 | 7 348 | 6 580 | 52.8 | 47.2 | 5.1 |
| Georgian SSR | 69.7 | 4 878 | 2 398 | 2 480 | 49.2 | 50.8 | 70.0 |
| Azerbaijan SSR | 86.6 | 5 514 | 2 821 | 2 693 | 51.2 | 48.8 | 63.7 |
| Armenian SSR | 29.8 | 2 728 | 1 699 | 1 029 | 62.3 | 37.7 | 91.6 |
| Estonian SSR | 45.1 | 1 418 | 954 | 464 | 67.3 | 32.7 | 31.4 |
| Latvian SSR | 63.7 | 2 454 | 1 584 | 870 | 64.6 | 35.4 | 38.5 |
| Lithuanian SSR | 65.2 | 3 262 | 1 796 | 1 466 | 55.0 | 45.0 | 50.0 |
| Total USSR[a] | 22 402.2 | 250 869 | 149 589 | 101 280 | 59.6 | 40.4 | 11.3 |

[a]This total also includes the White Sea and the Sea of Azov.
SOURCE: Central Statistical Office (1975), p. 9.

TABLE 4 Population (in thousands)[a] of each republic for the 1920–1979 period.

| Republic | Population of each republic | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1920 | 1926 | 1939 | 1951 | 1959 | 1966 | 1970 | 1974 | 1979 |
| RSFSR | 88 247 (64.5) | 92 735 (63.1) | 108 377 (56.8) | 102 945 (56.7) | 117 534 (56.3) | 127 189 (54.8) | 132 913 (53.8) | 132 913 (53.0) | 137 552 (52.4) |
| Ukrainian SSR | 26 400 (19.3) | 29 515 (20.1) | 40 469 (21.2) | 37 223 (20.5) | 41 869 (20.0) | 45 548 (19.6) | 47 126 (19.5) | 48 521 (19.3) | 49 757 (19.0) |
| Moldavian SSR | 233[b] (0.2) | 242[b] (0.2) | 2 452 (1.3) | 2 392 (1.3) | 2 885 (1.4) | 3 367 (1.4) | 3 569 (1.5) | 3 764 (1.5) | 3 948 (1.5) |
| Byelorussian SSR | 4 359 (3.2) | 4 986 (3.4) | 8 912 (4.7) | 7 781 (4.3) | 8 056 (3.9) | 8 656 (3.7) | 9 002 (3.7) | 9 268 (3.7) | 9 559 (3.6) |
| Uzbek SSR | 4 470 (3.3) | 4 621 (3.1) | 6 347 (3.3) | 6 434 (3.5) | 8 119 (3.9) | 10 399 (4.5) | 11 800 (4.9) | 13 289 (5.3) | 15 391 (5.9) |
| Kirghiz SSR | 860 (0.6) | 1 002 (0.7) | 1 458 (0.8) | 1 764 (1.0) | 2 066 (1.0) | 2 615 (1.1) | 2 933 (1.2) | 3 219 (1.3) | 3 529 (1.3) |
| Tadzhik SSR | 924 (0.7) | 1 032 (0.7) | 1 485 (0.8) | 1 554 (0.9) | 1 981 (0.9) | 2 556 (1.1) | 2 900 (1.2) | 3 283 (1.3) | 3 801 (1.4) |
| Turkmen SSR | 837 (0.6) | 998 (0.7) | 1 252 (0.6) | 1 225 (0.7) | 1 516 (0.7) | 1 917 (0.8) | 2 159 (0.9) | 2 430 (1.0) | 2 759 (1.0) |
| Kazakh SSR | 5 400 (3.9) | 6 025 (4.1) | 6 082 (3.2) | 6 813 (3.8) | 9 295 (4.5) | 12 047 (5.2) | 13 009 (5.4) | 13 928 (5.5) | 14 685 (5.6) |
| Georgian SSR | 2 408 (1.8) | 2 677 (1.8) | 3 540 (1.9) | 3 560 (1.9) | 4 044 (1.9) | 4 505 (1.9) | 4 686 (1.9) | 4 878 (1.9) | 5 016 (1.9) |
| Azerbaijan SSR | 1 952 (1.4) | 2 314 (1.5) | 3 205 (1.7) | 2 933 (1.6) | 3 698 (1.8) | 4 640 (2.0) | 5 117 (2.1) | 5 514 (2.2) | 6 028 (2.3) |
| Armenian SSR | 720 (0.5) | 881 (0.6) | 1 282 (0.7) | 1 360 (0.7) | 1 763 (0.8) | 2 239 (1.0) | 2 492 (1.0) | 2 728 (1.1) | 3 031 (1.2) |
| Estonian SSR | – | – | 1 052 (0.5) | 1 104 (0.6) | 1 197 (0.6) | 1 297 (0.6) | 1 356 (0.6) | 1 418 (0.6) | 1 466 (0.6) |
| Latvian SSR | – | – | 1 885 (1.0) | 1 954 (1.1) | 2 093 (1.0) | 2 279 (1.0) | 2 364 (1.0) | 2 454 (1.0) | 2 521 (1.0) |
| Lithuanian SSR | – | – | 2 880 (1.5) | 2 561 (1.4) | 2 711 (1.3) | 2 989 (1.3) | 3 128 (1.3) | 3 262 (1.3) | 3 399 (1.3) |
| Total USSR | 136 810 | 147 028 | 190 678 | 181 603 | 208 827 | 232 243 | 241 720 | 250 869 | 262 442 |

[a]The percentage of the total population is given in parentheses.
[b]Without the regions included in this republic as a result of reunification in 1939.
SOURCES: Central Statistical Office (1975), pp. 10–13 and *Izvestiya* (April 22, 1979).

TABLE 5 Urban and rural population (in thousands) in each republic for the 1920–1974 period.

| | Population of each republic | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1920 | | 1926 | | 1939 | | 1959 | | 1970 | | 1974 | |
| Republic | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| RSFSR | 12 553 | 75 694 | 16 455 | 76 280 | 36 296 | 72 081 | 61 611 | 55 923 | 80 981 | 49 098 | 88 231 | 44 682 |
| Ukrainian SSR | 5 110 | 21 290 | 5 673 | 23 842 | 13 569 | 26 900 | 19 147 | 22 722 | 25 688 | 21 438 | 28 195 | 20 326 |
| Moldavian SSR | 48[a] | 185[a] | 31[a] | 211[a] | 328 | 2 124 | 643 | 2 242 | 1 130 | 2 439 | 1 332 | 2 432 |
| Byelorussian SSR | 740 | 3 619 | 848 | 4 138 | 1 855 | 7 057 | 2 481 | 5 575 | 3 908 | 5 094 | 4 549 | 4 719 |
| Uzbek SSR | 807 | 3 663 | 1 012 | 3 609 | 1 470 | 4 877 | 2 729 | 5 390 | 4 322 | 7 478 | 5 030 | 8 259 |
| Kirghiz SSR | 93 | 767 | 122 | 880 | 270 | 1 188 | 696 | 1 370 | 1 098 | 1 835 | 1 228 | 1 991 |
| Tadzhik SSR | 58 | 866 | 106 | 926 | 249 | 1 236 | 646 | 1 335 | 1 077 | 1 823 | 1 242 | 2 041 |
| Turkmen SSR | 87 | 750 | 137 | 861 | 416 | 836 | 700 | 816 | 1 034 | 1 125 | 1 182 | 1 248 |
| Kazakh SSR | 380 | 5 020 | 519 | 5 506 | 1 690 | 4 392 | 4 067 | 5 228 | 6 538 | 6 471 | 7 348 | 6 580 |
| Georgian SSR | 481 | 1 927 | 594 | 2 083 | 1 066 | 2 474 | 1 713 | 2 331 | 2 240 | 2 446 | 2 398 | 2 480 |
| Azerbaijan SSR | 406 | 1 546 | 650 | 1 663 | 1 157 | 2 048 | 1 767 | 1 931 | 2 564 | 2 553 | 2 821 | 2 693 |
| Armenian SSR | 122 | 598 | 167 | 714 | 366 | 916 | 882 | 881 | 1 482 | 1 010 | 1 699 | 1 029 |
| Estonian SSR | – | – | – | – | 355 | 697 | 676 | 521 | 881 | 475 | 954 | 464 |
| Latvian SSR | – | – | – | – | 663 | 1 222 | 1 174 | 919 | 1 477 | 887 | 1 584 | 870 |
| Lithuanian SSR | – | – | – | – | 659 | 2 221 | 1 046 | 1 665 | 1 571 | 1 557 | 1 796 | 1 466 |
| Total USSR | 20 885 | 115 925 | 26 314 | 120 714 | 60 409 | 130 269 | 99 978 | 108 849 | 135 991 | 105 729 | 149 589 | 101 280 |

[a]Without the regions included in this republic as a result of reunification in 1939.
SOURCE: Central Statistical Office (1975), pp. 10 - 13.

TABLE 6 Percentage distribution of the population among the republics for the 1920–1974 period.

| | Percentage distribution | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1920 | | 1926 | | 1939 | | 1959 | | 1970 | | 1974 | |
| Republic | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| RSFSR | 60.1 | 65.3 | 62.5 | 63.2 | 60.1 | 55.3 | 61.6 | 51.4 | 59.5 | 46.4 | 59.0 | 44.1 |
| Ukrainian SSR | 24.5 | 18.4 | 21.6 | 19.7 | 22.5 | 20.6 | 19.2 | 20.9 | 18.9 | 20.3 | 18.8 | 20.1 |
| Moldavian SSR | 0.2 | 0.2 | 0.1 | 0.2 | 0.5 | 1.6 | 0.6 | 2.1 | 0.8 | 2.3 | 0.9 | 2.4 |
| Byelorussian SSR | 3.6 | 3.1 | 3.2 | 3.4 | 3.1 | 5.4 | 2.5 | 5.1 | 2.9 | 4.8 | 3.0 | 4.7 |
| Uzbek SSR | 3.9 | 3.2 | 3.8 | 3.0 | 2.4 | 3.7 | 2.7 | 5.0 | 3.2 | 7.1 | 3.4 | 8.2 |
| Kirghiz SSR | 0.4 | 0.7 | 0.5 | 0.7 | 0.4 | 0.9 | 0.7 | 1.3 | 0.8 | 1.7 | 0.8 | 2.0 |
| Tadzhik SSR | 0.3 | 0.7 | 0.4 | 0.8 | 0.4 | 1.0 | 0.6 | 1.2 | 0.8 | 1.7 | 0.9 | 2.0 |
| Turkmen SSR | 0.4 | 0.6 | 0.5 | 0.7 | 0.7 | 0.6 | 0.7 | 0.7 | 0.8 | 1.1 | 0.8 | 1.2 |
| Kazakh SSR | 1.8 | 4.3 | 2.0 | 4.6 | 2.8 | 3.4 | 4.1 | 4.8 | 4.8 | 6.1 | 4.9 | 6.5 |
| Georgian SSR | 2.3 | 1.7 | 2.3 | 1.7 | 1.8 | 1.9 | 1.7 | 2.1 | 1.6 | 2.3 | 1.6 | 2.4 |
| Azerbaijan SSR | 1.9 | 1.3 | 2.5 | 1.4 | 1.9 | 1.6 | 1.8 | 1.8 | 1.9 | 2.4 | 1.9 | 2.7 |
| Armenian SSR | 0.6 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.9 | 0.8 | 1.1 | 1.0 | 1.1 | 1.0 |
| Estonian SSR | – | – | – | – | 0.6 | 0.5 | 0.7 | 0.5 | 0.6 | 0.4 | 0.6 | 0.5 |
| Latvian SSR | – | – | – | – | 1.1 | 0.9 | 1.2 | 0.8 | 1.1 | 0.9 | 1.1 | 0.9 |
| Lithuanian SSR | – | – | – | – | 1.1 | 1.8 | 1.0 | 1.5 | 1.2 | 1.5 | 1.2 | 1.4 |
| Total USSR | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

SOURCE: Table 5.

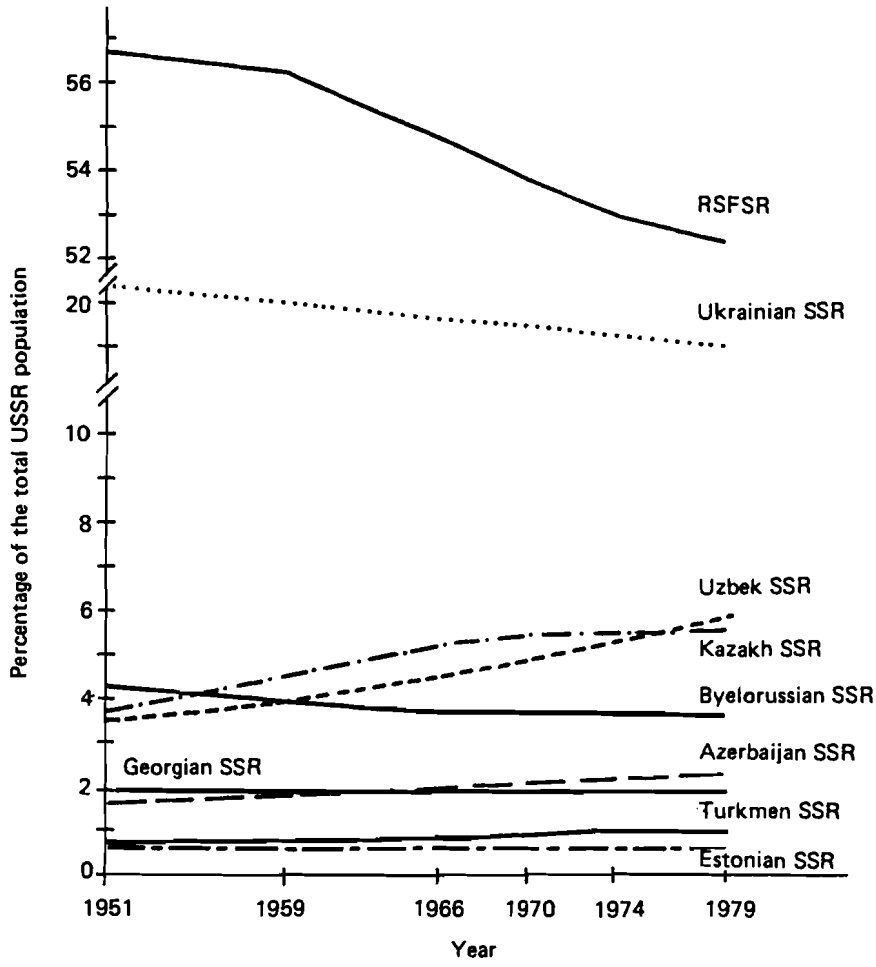


FIGURE 1 The percentage of the total population of several republics in the USSR, 1951–1979.

### *2.1 Fertility*

Differences among the crude birth rates of individual union republics (Table 7 and Figure 2) are the result of socioeconomic development and national traditions and customs. In 1940 the USSR had a comparatively high birth rate (over 30 per thousand), but even then, the Baltic Republics (Lithuania, Latvia, and Estonia), Moldavia, and Byelorussia were noted for a lower birth rate. High birth rates were recorded in the Armenian SSR (41.2 per thousand), the Kazakh SSR (40.8 per thousand), and the Turkmen SSR (36.9 per thousand) – the difference between the highest and lowest indices was 25.1 per thousand.

TABLE 7 Crude birth rates (per thousand) in each republic for the 1940–1975 period.

| Republic | Crude birth rates | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1940 | 1950 | 1955 | 1960 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | %[a] |
| RSFSR | 33.0 | 26.9 | 25.7 | 23.2 | 15.7 | 15.3 | 14.4 | 14.1 | 14.2 | 14.6 | 15.1 | 15.3 | 15.1 | 15.6 | 15.7 | 67.7 |
| Ukrainian SSR | 27.3 | 22.8 | 20.1 | 20.5 | 15.3 | 15.6 | 15.1 | 14.9 | 14.7 | 15.2 | 15.4 | 15.5 | 14.9 | 15.1 | 15.1 | 73.7 |
| Moldavian SSR | 26.6 | 38.9 | 30.4 | 29.3 | 20.4 | 21.0 | 20.7 | 20.0 | 19.0 | 19.4 | 20.2 | 20.6 | 20.4 | 20.4 | 20.7 | 70.6 |
| Byelorussian SSR | 26.8 | 25.5 | 24.9 | 24.4 | 17.9 | 17.6 | 16.8 | 16.4 | 15.9 | 16.2 | 16.4 | 16.1 | 15.7 | 15.8 | 15.7 | 64.3 |
| Uzbek SSR | 33.8 | 30.8 | 34.3 | 39.8 | 34.7 | 34.1 | 33.0 | 34.3 | 32.8 | 33.6 | 34.5 | 33.2 | 33.7 | 34.2 | 34.5 | 86.7 |
| Kirghiz SSR | 33.0 | 32.4 | 33.5 | 36.9 | 31.4 | 30.8 | 30.5 | 30.8 | 30.1 | 30.5 | 31.6 | 30.5 | 30.6 | 30.5 | 30.4 | 82.4 |
| Tadzhik SSR | 30.6 | 30.4 | 33.8 | 33.5 | 36.8 | 35.4 | 35.2 | 36.7 | 34.7 | 34.8 | 36.8 | 35.3 | 35.6 | 37.0 | 37.1 | 110.8 |
| Turkmen SSR | 36.9 | 38.2 | 40.7 | 42.4 | 37.2 | 37.6 | 35.5 | 35.6 | 34.3 | 35.2 | 34.7 | 33.9 | 34.3 | 34.0 | 34.4 | 81.1 |
| Kazakh SSR | 40.8 | 37.6 | 37.5 | 37.2 | 26.9 | 25.7 | 24.7 | 23.8 | 23.4 | 23.4 | 23.8 | 23.5 | 23.2 | 21.0 | 24.1 | 64.8 |
| Georgian SSR | 27.4 | 23.5 | 24.1 | 24.7 | 21.2 | 20.3 | 19.5 | 19.4 | 18.7 | 19.2 | 19.0 | 18.0 | 18.2 | 18.3 | 18.2 | 73.7 |
| Azerbaijan SSR | 29.4 | 31.2 | 37.8 | 42.6 | 36.6 | 35.4 | 32.5 | 32.1 | 29.3 | 29.2 | 27.7 | 25.6 | 25.4 | 25.0 | 25.1 | 58.9 |
| Armenian SSR | 41.2 | 32.1 | 38.0 | 40.1 | 28.6 | 27.1 | 24.4 | 23.9 | 22.8 | 22.1 | 22.6 | 22.5 | 22.1 | 21.0 | 22.4 | 55.9 |
| Estonian SSR | 16.1 | 18.4 | 17.9 | 16.6 | 14.6 | 14.3 | 14.2 | 14.9 | 15.5 | 15.8 | 16.0 | 15.6 | 15.0 | 15.1 | 14.9 | 89.8 |
| Latvian SSR | 19.3 | 17.0 | 16.4 | 16.7 | 13.8 | 14.0 | 13.9 | 14.0 | 14.0 | 14.5 | 14.7 | 14.5 | 13.9 | 14.2 | 14.0 | 83.8 |
| Lithuanian SSR | 23.0 | 23.6 | 21.1 | 22.5 | 18.1 | 18.0 | 17.7 | 17.6 | 17.4 | 17.6 | 17.6 | 17.0 | 16.0 | 15.8 | 15.7 | 69.8 |
| Total USSR | 31.2 | 26.7 | 25.7 | 24.9 | 18.4 | 18.2 | 17.3 | 17.2 | 17.0 | 17.4 | 17.8 | 17.8 | 17.6 | 18.0 | 18.1 | 72.7 |

[a]The ratio of the 1975 to the 1960 crude birth rate (in percent).

SOURCES: Central Statistical Office (1975), pp. 69–83 and (1976b), p. 45.

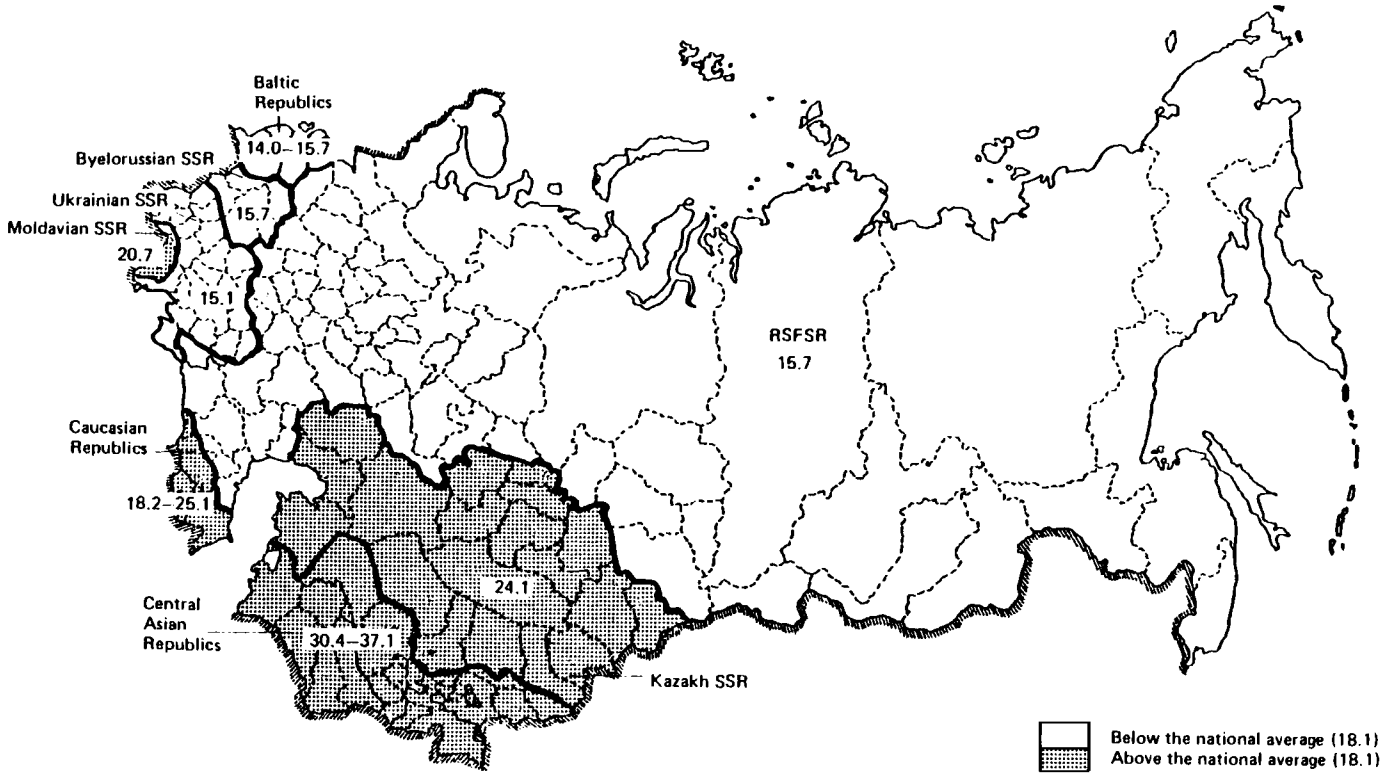


FIGURE 2 Crude birth rates in the republics of the USSR, 1975. Source: Table 7.

By 1960, an even greater difference in regional birth rates became evident. In the Central Asian Republics (Uzbek, Kazakh, Kirghiz, Tadzhik, and Turkmen)* and in the Azerbaijan and Moldavian SSRs, these rates became noticeably higher, while in the RSFSR, Ukraine, Byelorussia, and in the Baltic Republics (except Estonia), they fell. The highest birth rate in 1960 shifted to the Azerbaijan SSR, making the new difference between the highest and lowest birth rates in the USSR 26 per thousand.

From 1960 to 1969 a significant decrease in the birth rate took place in the USSR. This decrease affected all of the republics except the Tadzhik SSR, where the birth rate increased from 33.5 to 34.7 per thousand. Simultaneously, the greatest declines were observed in the Armenian SSR (43.1 percent), the RSFSR (38.8 percent), and the Moldavian SSR (more than 35 percent); the least decline was found in the Estonian SSR (6.6 percent). The national birth rate decreased until 1969 when it was 17.0 per thousand, at which point it began to increase and in 1975 reached 18.0 per thousand.

A detailed analysis was done by Pankrat'eva (1977) describing the dependence of the crude birth rates in the country's individual regions on the age composition of the female population. This study showed that in some republics (for example, Georgia, Azerbaijan, Moldavia, Lithuania, and Estonia) the decline in the crude birth rate was due to a change in the number of women of childbearing ages, while in other regions (for example, the RSFSR, the Armenian SSR, and the Kazakh SSR) the decline was connected with a change in age-specific fertility rates.

World War II left a substantial mark on birth-rate dynamics. In Figure 3, the birth-rate curve for the country as a whole shows two "waves" caused by the war: the first in the 1940s and the second in the 1960s, the generation born after the war. Data on the absolute number of births from 1960 to 1975 (Figure 4) give a clear picture of the birth-rate drop in the 1960s.

Today high birth rates persist in the Central Asian Republics, where the strong influence of national traditions and customs favoring large families prevails. Marriages between young people are encouraged and there is little family planning. By contrast, among the population of the RSFSR and the peoples of the Baltic Republics (as well as the Ukraine and Byelorussia) the birth rate is lower than the country's national average.

As Figure 2 illustrates, geographical and national variations still play an important role in birth-rate levels. In 1975, the birth rate in the Tadzhik SSR, the highest in the USSR, was 2.6 times higher than the birth rate in the Latvian SSR. These distinctions turn out to be even more significant when one considers the mix of nationalities in these republics. The birth rate of the native populations of the Central Asian Republics was almost four times higher than that of the Baltic peoples. Thus, the birth rate for the country as a whole is an aggregation of two different levels of population reproduction. On the one hand,

*Although the Kazakh SSR is considered a part of the Central Asian Republics, it is frequently referred to as a separate region in this analysis because of its size and the fact that it is a major economic region.

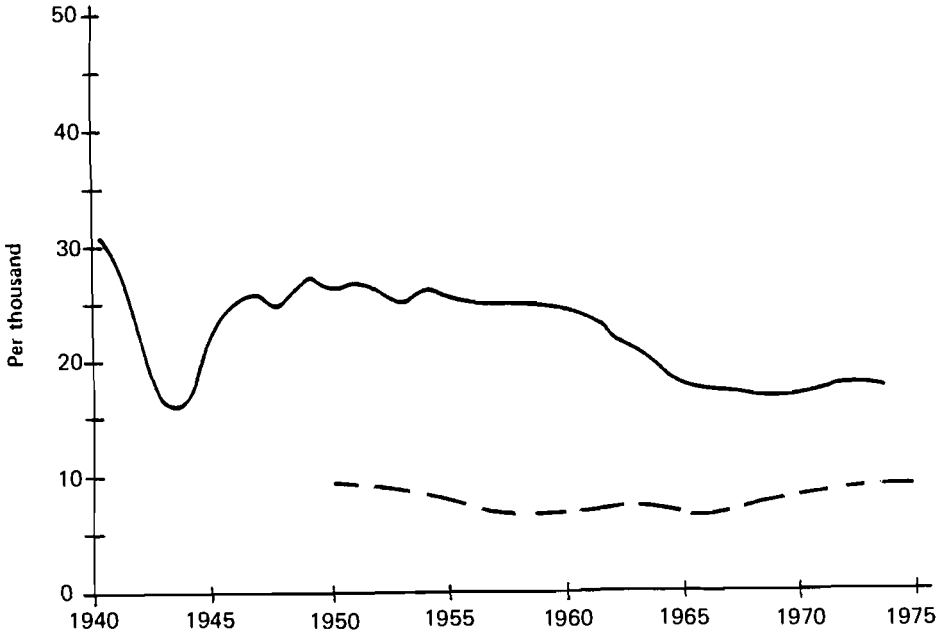


FIGURE 3 Crude birth (–) and death (- - -) rates for the USSR, 1940–1975. Sources: Central Statistical Office (1975) and Urlanis (1977), p. 18.

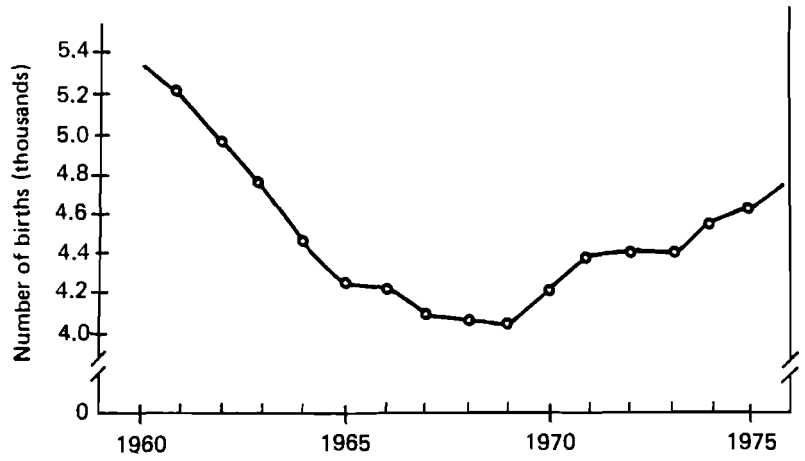


FIGURE 4 Number of births (in thousands) in the USSR, 1960–1975. Source: Urlanis (1977), p. 19.

there is the lower average birth rate in the Baltic Republics, the RSFSR, the Ukraine, and Byelorussia. On the other hand, there is the high birth rate in the Central Asian and the Caucasian Republics (Georgia, Azerbaijan, and Armenia).

Having described the national and regional birth-rate levels, we shall now analyze age-specific fertility rates to obtain a more exact description of changes in birth rates with respect to population age structure.

The fluctuation of age-specific fertility rates among the territories of the USSR (Table 8) is significant, not only for a comparison of the levels of fertility among women of the same age groups in individual regions of the country, but also because of the distribution of births within the entire reproductive period.

While in the majority of regions in the RSFSR, Ukrainian, and Baltic Republics a woman's reproductive period virtually ends before 40 years of age, in most of the Central Asian Republics and the Caucasian Republics (Georgian, Azerbaijan, and Armenian SSRs), it lasts considerably longer. As is apparent from Table 8, the fertility rate of the 40–44 age group in some of these republics is more than 100 births per 1000 women. The significant fluctuation of age-specific fertility rates among the republics is reflected in the overall fertility rates. In the RSFSR the average number of births per woman is 1.71; for the Uzbek, Tadzhik, and Turkmen Republics the average number is 6.0 – that is, 3.5 times higher than in the RSFSR (Kurman 1976b).

Examining the dynamics of age-specific fertility rates for the USSR as a whole in Table 9, one can see that the total fertility rate was 1.6 times lower by the end of the 1950s than it was in prewar years. Along with this, there was a fundamental change in the age pattern of fertility (Figure 5). In addition to the drop in fertility of all age groups, a decrease in the mean age of childbearing also occurred.

In 1960–1970, fertility rates continued to fall in all age groups; however, in 1970–1975 these rates began to increase in the pre-30 age groups only. It should be observed that since 1935 no generation of women has had a higher birth rate for the 25-years-and-under age groups than the generation born in the 1950s. This was due primarily to earlier marriages and a shift to a younger mean age of childbearing. In 1950, 54.7 percent of the women getting married were under 25; in 1973, their share was 73.8 percent, of whom 81.9 percent were marrying for the first time.

The average age of women getting married fell from 24.9 in 1965 to 22.6 in 1973, and that of men from 26.6 to 24.4 (Borisov 1976). At the same time the number of firstborns sharply increased. In 1970, 41.9 percent of all babies were firstborn. In 1973 the share increased to 44.3 percent (Table 10). This age-specific acceleration of fertility, however, did not significantly affect the overall increase in the birth rate in the 1970s because of the substantial drop experienced in the preceding years. The 1975 fertility level was still 1.7 times lower than in the prewar period.

TABLE 8 Age-specific fertility rates in each republic, 1972–1973.

| Republic | Number of births per 1000 women, by age group | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | 15–49 |
| RSFSR | 31.5 | 154.7 | 114.4 | 63.3 | 32.5 | 7.5 | 0.6 | 54.9 |
| Ukrainian SSR | 36.5 | 163.9 | 115.2 | 63.2 | 31.1 | 6.3 | 0.4 | 56.2 |
| Moldavian SSR | 30.6 | 180.9 | 140.9 | 94.7 | 58.1 | 18.4 | 1.5 | 75.6 |
| Byelorussian SSR | 23.6 | 170.6 | 135.3 | 77.5 | 39.3 | 9.7 | 0.8 | 59.7 |
| Uzbek SSR | 39.9 | 280.0 | 287.6 | 234.1 | 187.0 | 87.6 | 17.6 | 156.0 |
| Kirghiz SSR | 38.8 | 264.9 | 249.3 | 191.2 | 149.8 | 69.9 | 13.9 | 132.9 |
| Tadzhik SSR | 41.1 | 292.0 | 280.4 | 250.8 | 214.5 | 109.2 | 26.2 | 168.0 |
| Turkmen SSR | 27.2 | 273.3 | 301.1 | 238.1 | 203.1 | 105.8 | 24.7 | 159.3 |
| Kazakh SSR | 28.7 | 199.9 | 187.2 | 126.5 | 86.6 | 29.1 | 5.8 | 93.6 |
| Georgian SSR | 32.3 | 184.8 | 157.2 | 83.9 | 42.9 | 11.1 | 2.1 | 69.0 |
| Azerbaijan SSR | 24.0 | 218.0 | 231.3 | 173.7 | 128.3 | 43.9 | 7.1 | 111.4 |
| Armenian SSR | 37.3 | 214.3 | 180.4 | 97.1 | 61.5 | 20.3 | 3.1 | 87.3 |
| Estonian SSR | 31.3 | 165.1 | 126.1 | 67.9 | 31.6 | 6.6 | 0.4 | 58.5 |
| Latvian SSR | 26.7 | 147.7 | 116.5 | 67.5 | 31.3 | 7.0 | 0.4 | 53.8 |
| Lithuanian SSR | 22.3 | 160.1 | 134.1 | 83.0 | 43.5 | 13.7 | 1.0 | 63.1 |
| Total USSR | 32.4 | 172.3 | 135.9 | 81.8 | 48.0 | 14.3 | 1.9 | 66.4 |

SOURCE: Central Statistical Office (1975), pp. 137, 138.

In any country, fertility depends on an intricate combination of socioeconomic factors. The change in the tenor of life of the Soviet people, the growth of prosperity, the social demands for an increased level of educational and cultural resources, the changing needs of the population in connection with urbanization and growth, the change of value orientations in the use of leisure time, the growing employment of women in public labor – all of these factors have contributed to the decrease in the fertility of the population.

As is apparent from Table 11, the age-specific fertility levels of urban and rural populations in the USSR are quite different: fertility is higher for rural than for urban populations. In 1960, the number of births per 1000 women in the rural areas was 51.3 percent higher than in the urban areas. These differences are generated by the varying conditions and ways of life between urban and rural populations that have developed historically. With each passing year, these differences are becoming minimized but even so they are still significant.

### *2.2 Mortality*

The crude death rate in the USSR has shown a tendency to fall in the past four decades, as illustrated in Figure 3. In 1973 the crude death rate in the USSR was 48.3 percent of the 1940 level, and the average life expectancy during this time increased from 44 years to 70 years (64 for men and 74 for women). The

TABLE 9 Age-specific fertility rates in the USSR, 1938–1975.

| Age group | 1938–1939 | 1958–1959 | 1960–1961 | 1965–1966 | 1969–1970 | 1970–1971 | 1972–1973 | 1973–1974 | 1974–1975 | %[a] |
|---|---|---|---|---|---|---|---|---|---|---|
| 15–19 | 32.8 | 29.2 | 35.2 | 25.5 | 30.4 | 32.0 | 32.4 | 33.3 | 34.4 | 107.5 |
| 20–24 | 214.4 | 162.2 | 164.8 | 159.6 | 163.9 | 170.2 | 172.3 | 173.4 | 176.8 | 103.9 |
| 25–29 | 230.6 | 164.8 | 160.7 | 136.0 | 128.7 | 132.1 | 135.9 | 134.8 | 133.5 | 101.1 |
| 30–34 | 183.5 | 110.1 | 110.0 | 97.0 | 88.1 | 87.1 | 81.8 | 79.3 | 77.9 | 89.4 |
| 35–39 | 131.7 | 66.6 | 60.7 | 50.6 | 48.5 | 49.6 | 48.0 | 45.5 | 42.7 | 86.1 |
| 40–44 | 68.1 | 24.1 | 23.5 | 19.1 | 15.3 | 14.9 | 14.3 | 14.4 | 14.4 | 96.6 |
| 45–49[a] | 19.0 | 5.0 | 4.8 | 4.4 | 2.9 | 2.4 | 1.9 | 1.7 | 1.8 | 75.0 |
| 15–49[b] | 139.5 | 88.7 | 90.6 | 70.8 | 65.7 | 66.9 | 66.4 | 66.8 | 67.8 | 101.3 |

[a]The ratio of the 1974–1975 to the 1970–1971 fertility rate (in percent).
[b]In determining coefficients for the 45–49 and 15–49 age groups, births to women over 49 are included.
SOURCES: Central Statistical Office (1975), p. 136 and Pankrat'eva (1977), pp. 13, 14.

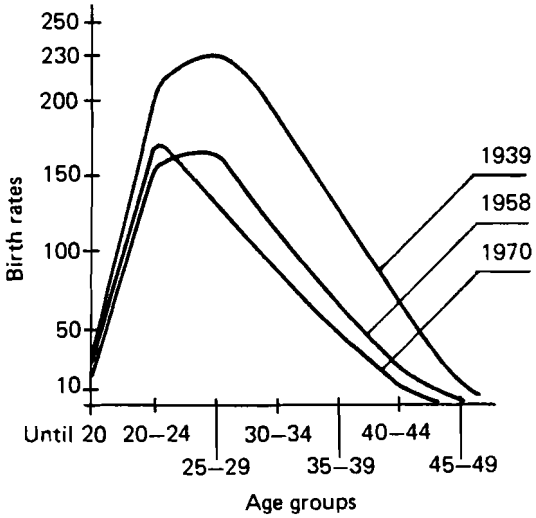


FIGURE 5 Age-specific fertility rates of women in the USSR, 1939, 1958, and 1970. Source: Kalinjuk (1975).

fall in the death rate and the increase in average life expectancy were a result of the increased standard of living and the improvement of labor conditions, as well as a consequence of achievements in health care and medicine.

From 1960 to 1966 the crude death rate stabilized, but since that time it has risen: in 1966 it was 7.3 per thousand and in 1975 it was 9.3 per thousand. The crude death rate, however, is a function of the age–sex structure of the entire population and therefore does not give a true representation of the mortality rate.

The age-specific mortality rate (Table 12) provides a more precise description of the mortality trends in a country. As the calculations conducted by Pankrat'eva (1977) on the influence of age on the crude death rate showed, the increased rates were a consequence of changes in the population's age structure. Between 1958–1959 and 1973–1974 there was a crude death rate increase of 17.6 percent: the true increase was only 2.0 percent, while the increase due to changes in the age structure was 15.6 percent. As the proportion of the population in the older age groups grew, the crude death rate rose. This increase was largely due to the war and its influence on the health and mortality of the people in these age groups.

During the period of observation, 1958–1975 (see Table 12), mortality fell by 31 percent in the under-5 age group, by more than 36 percent in the 5–9 age group, and by almost 38 percent in the 10–14 age group. Infant mortality also dropped considerably. In 1940 the difference between the greatest and the smallest index of infant mortality was 144 percent, whereas in 1967 it was only 26 percent. This discrepancy, however, is sufficiently large for one to see that there are still enormous possibilities for lowering infant mortality.

TABLE 10 Distribution of babies according to order of birth in the USSR, 1966–1973.

| | Distribution (%) | | | Change in comparison with 1966 | | | |
|---|---|---|---|---|---|---|---|
| Year | Firstborn | Secondborn | Thirdborn | Total births | Firstborn | Secondborn | Thirdborn |
| 1966 | 34.8 | 27.5 | 37.7 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1967 | 36.1 | 27.2 | 36.7 | 96.5 | 100.1 | 95.4 | 93.9 |
| 1968 | 37.3 | 26.7 | 36.0 | 96.4 | 103.3 | 93.5 | 92.0 |
| 1969 | 39.2 | 27.1 | 33.7 | 96.4 | 108.6 | 94.9 | 86.1 |
| 1970 | 41.9 | 26.5 | 31.6 | 99.7 | 120.0 | 96.1 | 83.6 |
| 1971 | 43.1 | 26.6 | 30.3 | 103.1 | 127.7 | 99.6 | 82.8 |
| 1972 | 43.9 | 27.3 | 28.8 | 103.8 | 130.9 | 103.0 | 78.7 |
| 1973 | 44.3 | 27.7 | 28.0 | 103.5 | 131.7 | 104.3 | 76.9 |

SOURCE: Kurman (1976a), p. 86.

The group of children under 1 year of age is the only age group in which there are significant differences in mortality levels among individual regions of the country. The share of deaths in specific regions substantially influences the country's total mortality level. There exists here, then, a large potential for a decline in the total mortality rate by reducing the number of deaths in the 0–1 age group in certain regions of the USSR. In all the remaining age groups, mortality indices for the various regions are similar.

As well as being a function of the age distribution, death rates are dependent on the sex structure of the population. In all age groups, the mortality level is lower among women than among men (Figure 6). As child mortality falls, deaths from causes affecting men more than women seem to play a larger role. Among men, there is a higher mortality rate from cardiovascular diseases, malignant tumors, and accidents.

Analysis of male and female mortality trends in the individual age groups shows that the most pronounced difference is observed for the 20–40 age groups. For these groups,not only is the difference in mortality rates between the sexes substantial, but also these changes tend to occur in opposite directions. This is shown clearly in Figure 7. The mortality rate of women in the 25–35 age group in 1968–1971 was 20–40 percent *lower* than the corresponding mortality rate in 1958–1959. The mortality rate for men, however, was 10–29 percent *higher* for the same period.

In Table 13, data are introduced on male and female mortality in each republic of the USSR. The data show that there is a higher mortality rate among men than women in all union republics. There are wide variations in the difference between mortality rates for men and women, however, among the individual regions. For example, in the Kazakh SSR in 1973, the difference between the crude death rate for men and that for women was 2.0 per thousand, while in the Estonian SSR it was only 0.1 per thousand.

TABLE 11 Age-specific fertility rates in the urban and rural areas of the USSR (per thousand women), 1960–1973.

| Age group | 1960–1961 | | | 1965–1966 | | | 1969–1970 | | | 1972–1973 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban | Rural | %[a] | Urban | Rural | %[a] | Urban | Rural | %[a] | Urban | Rural | %[a] |
| 15–19 | 28.9 | 42.4 | 146.7 | 25.8 | 25.1 | 97.3 | 28.5 | 33.8 | 118.6 | 30.5 | 35.4 | 116.1 |
| 20–24 | 143.4 | 193.7 | 135.1 | 137.5 | 198.1 | 144.1 | 144.2 | 209.5 | 145.3 | 147.3 | 236.5 | 160.6 |
| 25–29 | 131.9 | 195.2 | 148.0 | 111.0 | 177.6 | 160.0 | 108.8 | 163.2 | 150.0 | 115.3 | 184.5 | 160.0 |
| 30–34 | 83.0 | 143.0 | 172.3 | 69.6 | 135.0 | 194.0 | 68.6 | 121.9 | 177.7 | 64.1 | 115.1 | 179.6 |
| 35–39 | 40.5 | 85.4 | 210.8 | 31.3 | 77.3 | 247.0 | 29.6 | 75.5 | 255.1 | 31.3 | 76.5 | 244.4 |
| 40–44 | 11.5 | 37.3 | 324.3 | 9.4 | 32.2 | 342.6 | 7.3 | 27.0 | 369.9 | 6.5 | 25.8 | 396.9 |
| 45–49 | 1.4 | 7.3 | 521.4 | 1.3 | 8.4 | 646.2 | 1.1 | 5.5 | 500.0 | 0.6 | 3.8 | 633.3 |
| 15–49 | 73.5 | 111.2 | 151.3 | 57.0 | 90.4 | 158.6 | 55.7 | 82.3 | 147.8 | 57.5 | 82.7 | 143.8 |

[a]The rural fertility rate as a percentage of the urban fertility rate.

SOURCE: Central Statistical Office (1975), p. 136.

TABLE 12 Age-specific mortality rates (deaths per thousand) in the USSR, 1958–1975.

| Age group | 1958–1959 | 1965–1966 | 1969–1970 | 1972–1973 | 1973–1974 | 1974–1975 | %[a] |
|---|---|---|---|---|---|---|---|
| 0–4 | 11.9 | 6.9 | 6.9 | 7.2 | 7.7 | 8.2 | 68.9 |
| 5–9 | 1.1 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 63.6 |
| 10–14 | 0.8 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 62.5 |
| 15–19 | 1.3 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 76.9 |
| 20–24 | 1.8 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 94.4 |
| 25–29 | 2.2 | 2.0 | 2.2 | 2.1 | 2.0 | 2.1 | 95.5 |
| 30–34 | 2.6 | 2.6 | 2.8 | 2.8 | 2.8 | 3.0 | 115.4 |
| 35–39 | 3.1 | 3.2 | 3.7 | 3.6 | 3.6 | 3.7 | 119.4 |
| 40–44 | 4.0 | 3.9 | 4.7 | 4.8 | 4.9 | 5.2 | 130.0 |
| 45–49 | 5.4 | 5.1 | 6.0 | 6.2 | 6.4 | 6.7 | 124.1 |
| 50–54 | 7.9 | 7.9 | 8.7 | 8.6 | 8.8 | 9.0 | 113.9 |
| 55–59 | 11.2 | 11.1 | 11.7 | 12.5 | 12.3 | 13.0 | 116.1 |
| 60–64 | 17.1 | 17.2 | 18.0 | 18.0 | 18.2 | 18.3 | 107.0 |
| 65–69 | 25.2 | 25.5 | 27.5 | 27.2 | 27.0 | 27.4 | 108.7 |
| 70+ | 63.8 | 65.8 | 75.7 | 75.5 | 73.5 | 73.3 | 114.9 |
| Total population | 7.4 | 7.3 | 8.2 | 8.6 | 8.7 | 9.0 | 121.6 |

[a]The 1974–1975 mortality rate as a percentage of the 1958–1959 mortality rate.
SOURCES: Central Statistical Office (1975), p. 141 and (1976), p. 43.

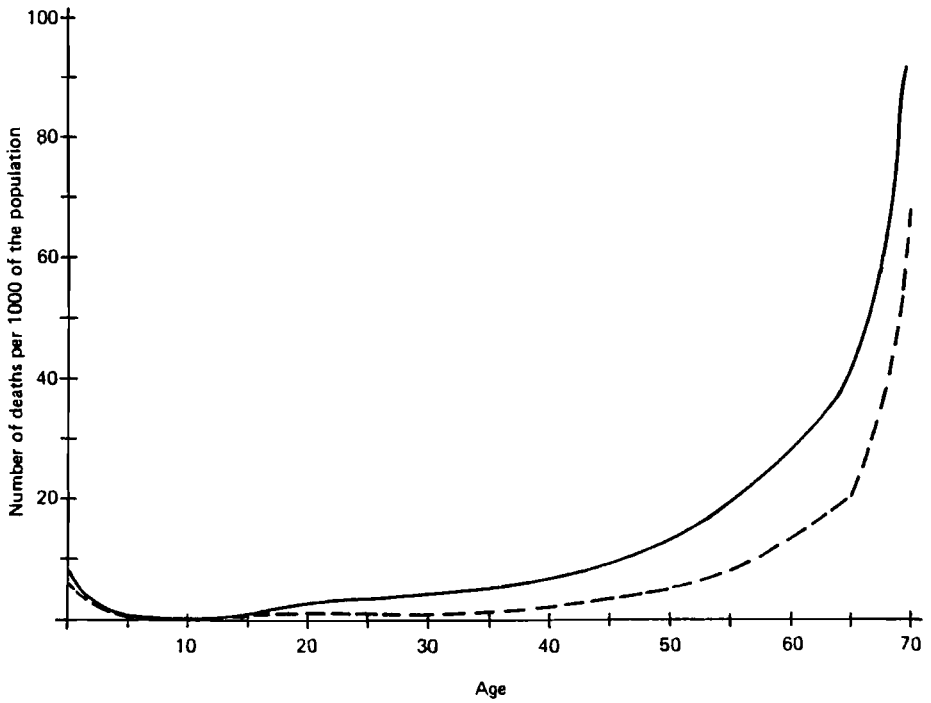


FIGURE 6 Age-specific mortality rates by sex, USSR, 1972–1973: (–) men; (- - -) women. Source: Central Statistical Office (1975), p. 142.

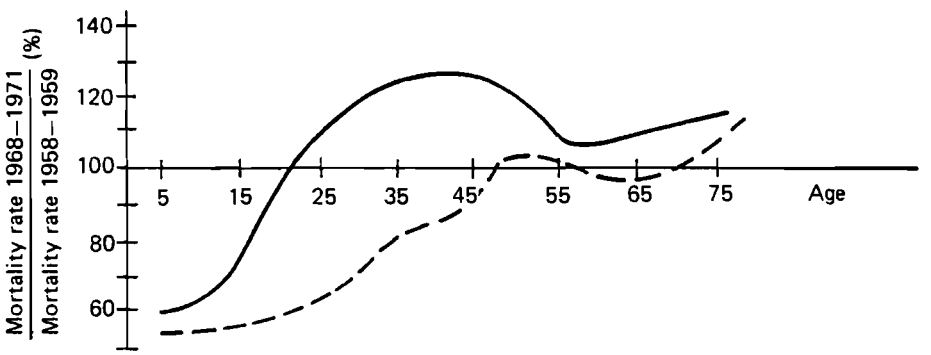


FIGURE 7 Age- and sex-specific mortality rates, 1968–1971, as a percentage of the corresponding rates in 1958–1959; (–) men; (- - -) women. Source: Vishnevshkii (1977), p. 45.

TABLE 13 Crude death rates (per thousand) of the male and female populations in each republic, 1965–1973.

| | Number of deaths per 1000 population | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1965 | | | 1970 | | | 1973 | | |
| Republic | Men | Women | Both sexes | Men | Women | Both sexes | Men | Women | Both sexes |
| RSFSR | 8.1 | 7.1 | 7.6 | 9.4 | 8.1 | 8.7 | 9.7 | 8.7 | 9.2 |
| Ukrainian SSR | 8.0 | 7.2 | 7.6 | 9.4 | 8.4 | 8.9 | 9.7 | 9.0 | 9.3 |
| Moldavian SSR | 6.5 | 5.9 | 6.2 | 7.9 | 6.9 | 7.4 | 8.8 | 7.7 | 8.2 |
| Byelorussian SSR | 7.2 | 6.4 | 6.8 | 8.1 | 7.3 | 7.6 | 8.4 | 7.7 | 8.0 |
| Uzbek SSR | 6.5 | 5.3 | 5.9 | 6.2 | 4.9 | 5.5 | 7.0 | 5.7 | 6.4 |
| Kirghiz SSR | 7.4 | 5.7 | 6.5 | 8.3 | 6.5 | 7.4 | 8.5 | 6.7 | 7.6 |
| Tadzhik SSR | 6.8 | 6.3 | 6.6 | 6.7 | 6.0 | 6.4 | 7.7 | 6.8 | 7.2 |
| Turkmen SSR | 7.4 | 6.5 | 7.0 | 7.3 | 5.9 | 6.6 | 7.6 | 6.9 | 7.2 |
| Kazakh SSR | 6.8 | 5.1 | 5.9 | 7.1 | 5.0 | 6.0 | 7.6 | 5.6 | 6.5 |
| Georgian SSR | 7.8 | 6.2 | 7.0 | 8.2 | 6.4 | 7.3 | 8.2 | 6.7 | 7.4 |
| Azerbaijan SSR | 6.8 | 5.9 | 6.4 | 7.3 | 6.1 | 6.7 | 6.7 | 6.0 | 6.4 |
| Armenian SSR | 6.2 | 5.3 | 5.7 | 5.5 | 4.7 | 5.1 | 5.6 | 4.8 | 5.2 |
| Estonian SSR | 10.5 | 10.4 | 10.5 | 11.3 | 11.0 | 11.1 | 11.0 | 11.1 | 11.0 |
| Latvian SSR | 10.6 | 9.6 | 10.1 | 11.5 | 10.9 | 11.2 | 12.0 | 11.2 | 11.5 |
| Lithuanian SSR | 8.5 | 7.4 | 7.9 | 9.8 | 8.1 | 8.9 | 9.8 | 8.2 | 9.0 |
| Total USSR | 7.8 | 6.9 | 7.3 | 8.9 | 7.7 | 8.2 | 9.2 | 8.2 | 8.7 |

SOURCE: Central Statistical Office (1975), pp. 100, 101.

Many of the differences in the death rates in the individual republics may be explained by differences in population age structure. The highest crude death rate was found in the Baltic Republics (in the Estonian and Latvian SSRs) where the birth rate was low and the share of population over 60 was high. Lowest mortality rates of 5.2–6.4 per thousand occurred in the republics where the birth rate was high and a large share of the population was young.

The existing variation of birth rates among the individual republics of the USSR also leaves its mark on the natural increase rate (Table 14 and Figures 8 and 9). The highest natural increase rates in 1971–1973 were found in the Tadzhik, Uzbek, and Turkmen SSRs (27–31 per thousand) and the lowest in the Latvian and Estonian SSRs (2–5 per thousand).

### *2.3 Migration*

In discussing migration it is useful to differentiate between urban–urban migration between several regions and rural–urban migration. These two migration flows are particularly interesting because of their recent trends, which result from the difference between life in the city and life in the country: industrial versus agricultural labor, collective versus state ownership of the means of production, and urban versus rural quality of life.

The principal source of the migration data used in this report is the continuously updated national register of each individual's permanent place of residence. These unpublished data and special tabulations, carried out for other purposes, produced the age-specific migration flows used here. The standard definition of an internal migrant in the Soviet Union states two conditions: first, that the change of permanent residence involves a change in community (commune) of residence and second, that the duration of stay in the new place of permanent residence must exceed a minimum of 2 years. At the present time, there is more information available for urban than for rural populations due to the quality of registration. We therefore have more accurate data on the urban than the rural populations.

Differences in urban and rural migration in the USSR are depicted graphically in Figure 10 and listed in Table 15. As the table shows, migration of the rural population, at the national level, exceeds that of the urban population by 24.9 percent. The highest rural migration rates occur in the RSFSR, the Baltic Republics, and the Ukrainian Republic. The out-migration of the rural population in these republics is higher than their natural increase, resulting in an absolute decrease in the number of people living in these rural areas. In the Byelorussian SSR the level of migration is approximately identical for both urban and rural populations. In the Moldavian, Caucasian, and Central Asian Republics, the migration rate of the rural population is lower than that of the urban.

As is apparent from Figure 10, the total number of in- and out-migrants in the USSR grew by 23.2 percent between 1961 and 1973 (Khorev and

TABLE 14 Crude birth rates, death rates, and rates of natural increase (per thousand) in each republic, 1971–1973.

| Republic | 1971 | | | 1972 | | | 1973 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Birth rate | Death rate | Rate of increase | Birth rate | Death rate | Rate of increase | Birth rate | Death rate | Rate of increase |
| RSFSR | 15.1 | 8.7 | 6.4 | 15.3 | 9.0 | 6.3 | 15.1 | 9.2 | 5.9 |
| Ukrainian SSR | 15.4 | 8.9 | 6.5 | 15.5 | 9.2 | 6.3 | 14.9 | 9.3 | 5.6 |
| Moldavian SSR | 20.2 | 7.7 | 12.5 | 20.6 | 7.6 | 13.0 | 20.4 | 8.2 | 12.2 |
| Byelorussian SSR | 16.4 | 7.5 | 8.9 | 16.1 | 7.8 | 8.3 | 15.7 | 8.0 | 7.7 |
| Uzbek SSR | 34.5 | 5.4 | 29.1 | 33.2 | 6.1 | 27.1 | 33.7 | 6.4 | 27.3 |
| Kirghiz SSR | 31.6 | 7.0 | 24.6 | 30.5 | 7.4 | 23.1 | 30.6 | 7.6 | 23.0 |
| Tadzhik SSR | 36.8 | 5.7 | 31.1 | 35.3 | 6.3 | 29.0 | 35.6 | 7.2 | 28.4 |
| Turkmen SSR | 34.7 | 6.7 | 28.0 | 33.9 | 7.2 | 26.7 | 34.3 | 7.2 | 27.1 |
| Kazakh SSR | 23.8 | 6.0 | 17.8 | 23.5 | 6.3 | 17.2 | 23.2 | 6.5 | 16.7 |
| Georgian SSR | 19.0 | 7.4 | 11.6 | 18.0 | 7.6 | 10.4 | 18.2 | 7.4 | 10.8 |
| Azerbaijan SSR | 27.7 | 6.5 | 21.2 | 25.6 | 6.6 | 19.0 | 25.4 | 6.4 | 19.0 |
| Armenian SSR | 22.6 | 4.9 | 17.7 | 22.5 | 5.2 | 17.3 | 22.1 | 5.2 | 16.9 |
| Estonian SSR | 16.0 | 10.9 | 5.1 | 15.6 | 11.1 | 4.5 | 15.0 | 11.0 | 4.0 |
| Latvian SSR | 14.7 | 11.0 | 3.7 | 14.5 | 11.3 | 3.2 | 13.9 | 11.5 | 2.4 |
| Lithuanian SSR | 17.6 | 8.5 | 9.1 | 17.0 | 9.1 | 7.9 | 16.0 | 9.0 | 7.0 |
| Total USSR | 17.8 | 8.2 | 9.6 | 17.8 | 8.5 | 9.3 | 17.6 | 8.7 | 8.9 |

SOURCE: Central Statistical Office (1975), pp. 69–83.

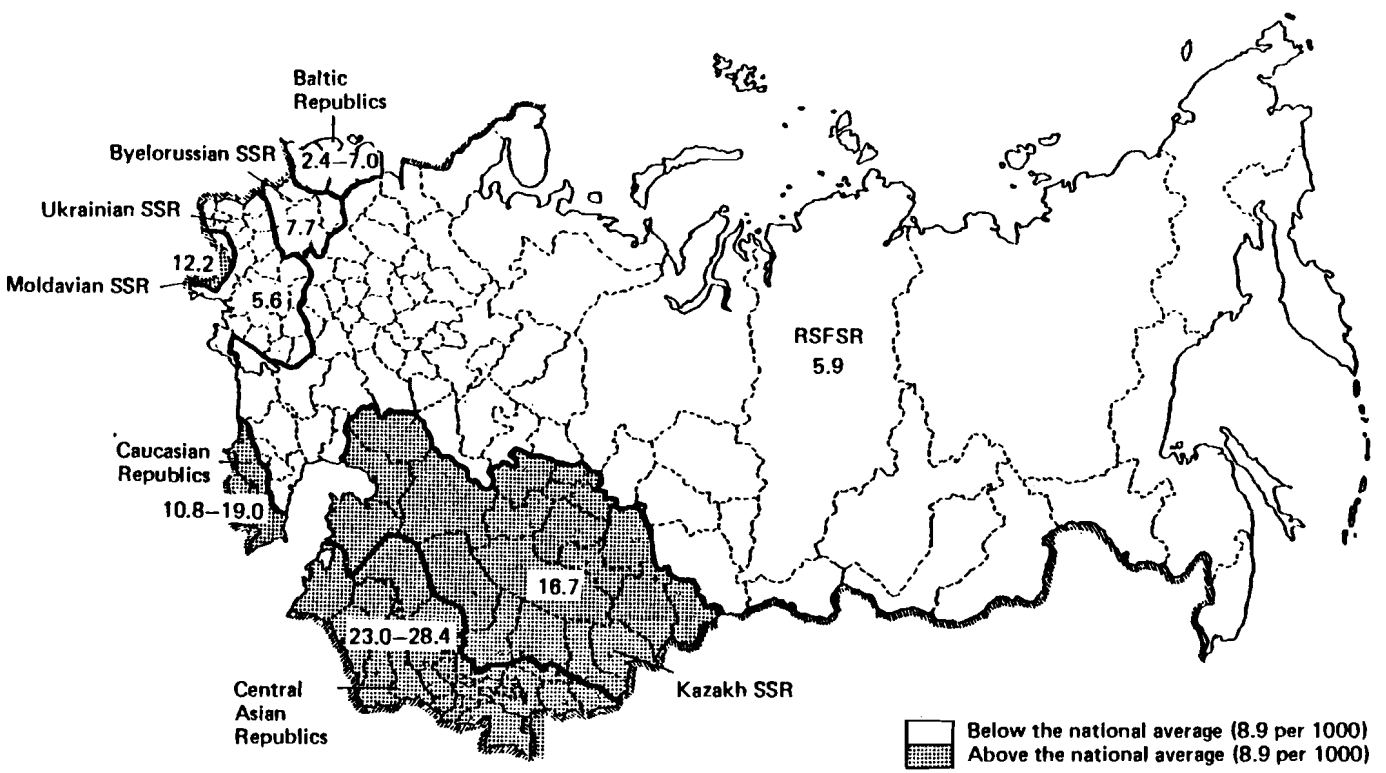


FIGURE 8 Natural increase rates in the USSR, 1973. Source: Table 14.

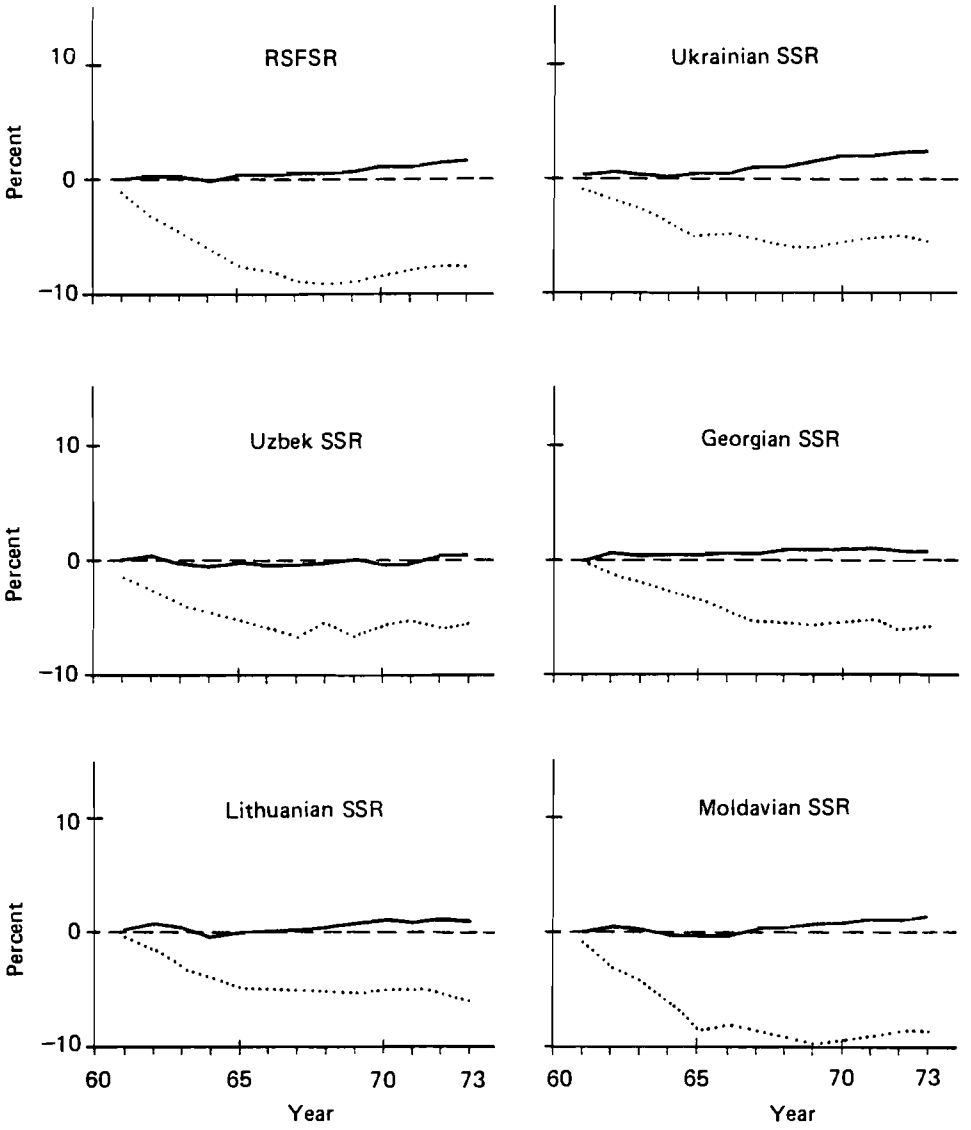


FIGURE 9 Comparison of crude birth (·····) and death (–) rates in the republics of the USSR: percentage change between 1960 and 1973.

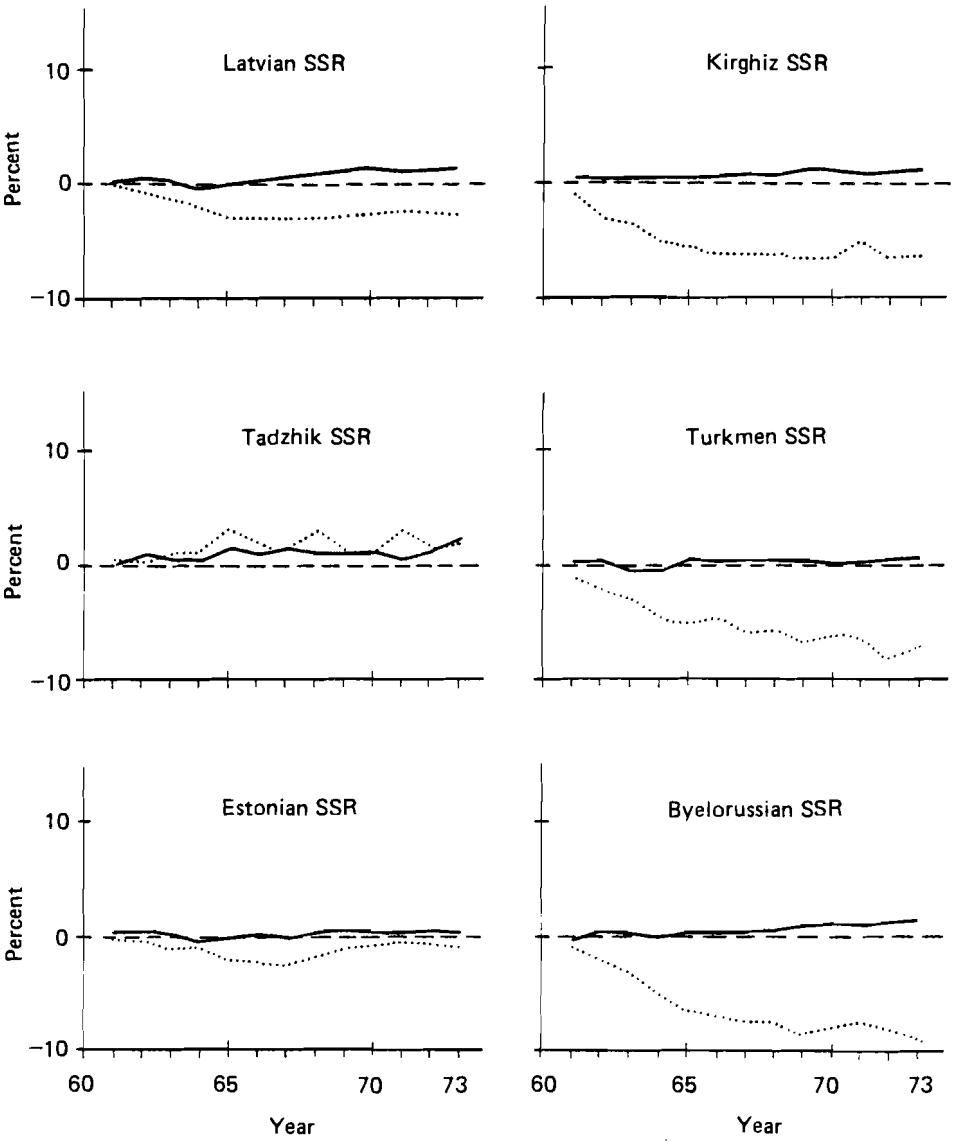


FIGURE 9 *Continued.*

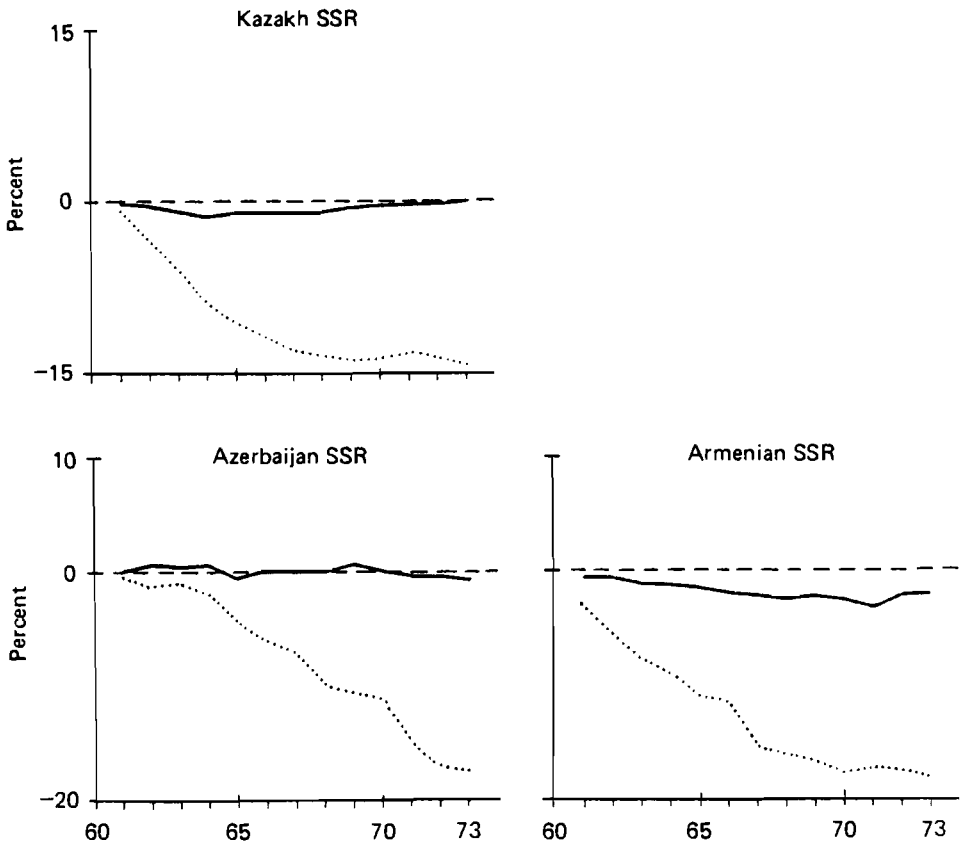


FIGURE 9 *Continued.*

Moiseyenko 1976) and the outward flow from rural areas increased by more than 80 percent. The increase in migration from rural areas is a direct result of high rates of urban industrialization, which cause a concentration of industrial production in the big cities and release the labor force from agricultural work.

Many specialists studying the question of migration in the USSR feel that this migratory flow from rural to urban areas will have a tendency to decline, whereas intercity (urban-to-urban) migration will increase in importance.

The growth of migration to urban areas has been influenced by a further deepening of labor division in urban and rural areas, caused by the growing demand for non-agricultural labor. The most important source of employment growth in cities has been the in-migration of the rural population, which contributed almost half of the total increase of employment in 1959–1970.

Socioeconomic differences between urban and rural areas play an important role in the redistribution of the population between cities and villages. A

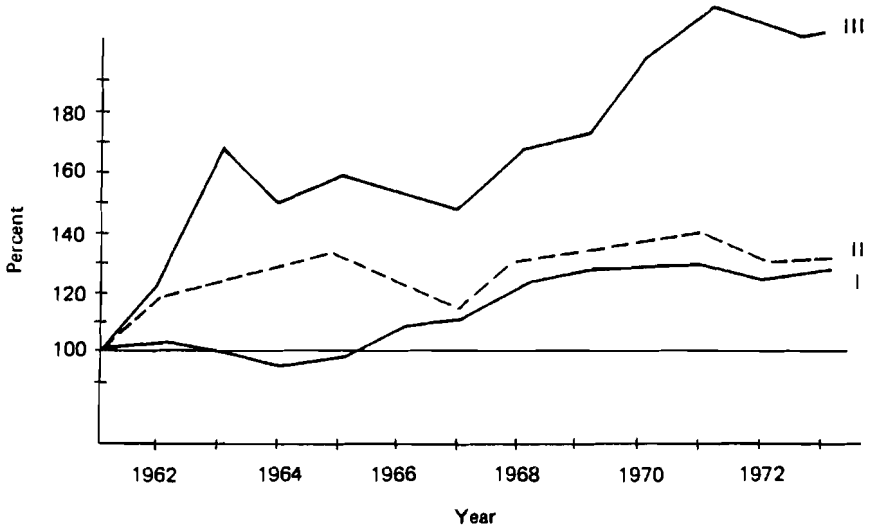


FIGURE 10 Crude urban and rural migration rates in the USSR, 1961–1973 (in percent, relative to 1961 rates). I – Total number of in-migrants and out-migrants; II – Inflow to urban areas; III – Outflow from rural areas. Source: Khorev and Moiseyenko (1976).

significant gap in the development of the productive forces in industry and in agriculture has been the basic reason for differences in the condition, level, and ways of life of the urban and rural populations. Because of this gap, the rural population has a lower level of income, a lag in the improvement of living and housing conditions, a different domestic economy, a need to organize a personal, secondary economy, and a different correlation between free time and work time (Khorev and Moiseyenko 1976).

Migration of the rural population into the cities fulfills an important economic and social function – the spatial redistribution of labor – thus raising the welfare of the rural inhabitants by means of specialized education and work according to ability and inclination. Migration, by redistributing manpower throughout the country, substantially influences different aspects of social and economic development in the individual regions. However, this movement of the rural population to non-agricultural activities in urban areas often deviates from the interests of society.

As stated above, the exchange between city and village is not equal in many regions. Rural areas lose several times more people than they receive in return. By far the majority of migrants entering the rural areas are those people who, having moved to the city, could not become acclimated to the new environment and chose to return to the conditions to which they were accustomed. More often, however, migrants leave rural areas and do not return. Skilled personnel whose education level is above that needed for the demands of the

TABLE 15 Crude migration rates (per thousand) of urban and rural populations in the USSR based on the 1970 census.

| Republic or economic region | Crude migration rate | | |
|---|---|---|---|
| | Urban | Rural | %[d] |
| RSFSR | 55.4 | 83.9 | 151.4 |
| Ukrainian SSR | 41.7 | 51.5 | 123.5 |
| Moldavian SSR | 48.2 | 42.2 | 87.6 |
| Byelorussian SSR | 50.2 | 51.6 | 102.8 |
| Central Asian region[a] | 46.7 | 25.1 | 53.7 |
| Kazakh SSR | 75.5 | 85.5 | 113.2 |
| Caucasian region[b] | 28.1 | 23.9 | 85.1 |
| Baltic region[c] | 41.7 | 63.2 | 151.6 |
| Total USSR | 51.8 | 64.7 | 124.9 |

[a]Uzbek, Kirghiz, Tadzhik, and Turkmen SSRs. Kazakh SSR is considered separately.
[b]Georgian, Azerbaijan, and Armenian SSRs.
[c]Estonian, Latvian, and Lithuanian SSRs.
[d]The rural crude migration rate as a percentage of the urban crude migration rate.
SOURCE: Khorev and Moiseyenko (1976), p. 56.

village, leave the rural area along with the young. Having received training in technical schools, skilled workers find employment easily and quickly adapt themselves to city life.

Migration from the village to the city also leaves a substantial imprint on the rate of natural increase in the rural areas. The out-migration of the young, healthy villagers lowers the demographic potential of the village. Fertility levels drop and so does the rate of natural increase. Furthermore, the village is left with a predominantly older and less healthy population as a result of the "selective" migration from village to city.

Another form of population redistribution occurs as a consequence of migration between economic regions and union republics. Table 16 presents data on the exchange of population between the union republics and the major economic regions of the USSR in the 1959–1970 period (Kurman 1976b).

The disproportion in the economic–geographic distribution of the population and manpower inherited from prerevolutionary times still persists to a certain extent in the USSR. This disproportion leads to a lack of manpower in some regions and a surplus in others. Since the Revolution, much has been done to overcome this imbalance, particularly in Kazakhstan. Before the Revolution, Kazakhstan was an outlying colonial district of the Russian Empire, regarded by Russian manufacturers as a source of raw materials and as a commodity market. The population of this region was made up primarily of the native population. In the post-revolutionary period, the increased industrialization of this region encouraged a significant inflow of people from other areas

TABLE 16 Population growth (annual average per thousand)[a] in the economic regions of the USSR, 1959–1970.

| Republic or economic region | Growth rate | Natural increase | Balance of migration |
|---|---|---|---|
| RSFSR | 9.2 (10.1) | 10.4 (11.5) | −1.2 (−1.4) |
| Ukrainian SSR | 10.7 (11.8) | 9.8 (10.7) | 0.9 (1.1) |
| Moldavian SSR | 19.3 (21.2) | 17.3 (19.1) | 2.0 (2.1) |
| Byelorussian SSR | 10.1 (11.1) | 13.3 (14.6) | −3.2 (−3.5) |
| Central Asian region | 33.2 (36.5) | 30.7 (33.8) | 2.5 (2.7) |
| Kazakh SSR | 30.2 (33.3) | 24.2 (26.7) | 6.0 (6.6) |
| Caucasian region | 23.2 (25.6) | 23.5 (26.0) | −0.3 (−0.4) |
| Baltic region | 12.4 (13.6) | 8.3 (9.1) | 4.1 (4.5) |
| Total USSR | 13.3 (14.6) | 13.3 (14.6) | – |

[a]The figures in parentheses represent the ‰ of the average population which is defined as:

$$\left(\frac{\text{Pop}(1970) - \text{Pop}(1959)}{1/2[\text{Pop}(1970) + \text{Pop}(1959)]}\right) 1000$$

SOURCE: Adapted from Kurman (1976a), pp. 134, 135.

of the Soviet Union. Between 1959 and 1970 alone, the Kazakh SSR experienced a positive net in-migration of around 0.75 million people, which amounted to an increase of more than 6 percent in its population during this period. Table 17 presents data, in the form of a matrix, on migratory flows between different regions.

It is apparent from Table 17 that the level of intraregional migration is high in all regions. For example, in 1968–1969 the percentage of out-migrants that left for other communes in the same economic region was 54.6 percent for the Central Asian region, 74.5 percent for the Ukrainian SSR, and 87.9 percent for the RSFSR. This tendency also holds for the in-migrants of individual economic regions. That is, intraregional population redistribution is the most important tendency of the total migration among all regions.

In this population exchange, the majority of the observed regions interact primarily with a limited number of other regions. Those regions losing significant numbers of people to other regions generally receive the bulk of the migrants from these same regions; that is, the population exchange is usually symmetric. This is mainly due to territorial, economic, and cultural proximity.

The RSFSR and the Kazakh SSR are regions with a broad and dispersed range of migratory interaction. On the other hand, there are regions with a highly limited sphere of migration interaction: the Baltic Republics, the Caucasian region, and the Byelorussian and Moldavian SSRs. In view of the significant number of migrants over the country as a whole (more than 11

TABLE 17 Migration among the republics and economic regions of the USSR, 1968–1969 (in thousands and in percent[a]).

| Region of destination | Region of origin | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | RSFSR | Ukrainian SSR | Moldavian SSR | Byelorussian SSR | Central Asian region | Kazakh SSR | Caucasian region | Baltic region |
| RSFSR | 7604 (87.9) | 428 (19.6) | 30 (18.8) | 85 (18.5) | 203 (27.6) | 298 (28.4) | 76 (26.5) | 9 (20.2) |
| Ukrainian SSR | 420 (4.9) | 1621 (74.5) | 18 (11.4) | 22 (4.8) | 32 (4.4) | 66 (6.3) | 17 (5.9) | 15 (3.2) |
| Moldavian SSR | 23 (0.3) | 18 (0.8) | 99 (62.4) | 1 (0.2) | 2 (0.3) | 5 (0.5) | 1 (0.3) | 0 (0.0) |
| Byelorussian SSR | 79 (0.9) | 23 (1.1) | 1 (0.6) | 326 (70.7) | 6 (0.8) | 19 (1.8) | 2 (0.8) | 6 (1.3) |
| Central Asian region | 132 (1.5) | 14 (0.6) | 1 (0.6) | 2 (0.4) | 400 (54.6) | 47 (4.5) | 4 (1.4) | 3 (0.5) |
| Kazakh SSR | 262 (3.0) | 48 (2.2) | 8 (5.0) | 9 (1.9) | 82 (11.2) | 603 (57.4) | 8 (2.8) | 6 (1.3) |
| Caucasian region | 29 (0.3) | 7 (0.3) | 1 (0.6) | 1 (0.2) | 3 (0.4) | 3 (0.3) | 178 (62.0) | 0 (0.0) |
| Baltic region | 105 (1.2) | 20 (0.9) | 1 (0.6) | 15 (3.3) | 5 (0.7) | 9 (0.8) | 1 (0.3) | 346 (73.5) |

[a]Figures in parentheses represent the percentage of total out-migrants from each region.
SOURCE: Adapted from Kurman (1976a), pp. 136, 137.

percent of the total population in the 1968–1969 period), the "efficiency" of migration is not very high. For example, the Ukrainian SSR received only 102 in-migrants for every 100 out-migrants, and in the Byelorussian SSR, the number of in-migrants almost equaled the number of out-migrants.

The intensity of migration depends on a multitude of diverse factors – economic, geographic, sociological, ethnic, cultural, legal, etc. It is also a well-known fact that identical conditions evoke varying intensities of migration in different age–sex groups.

Table 18 gives the population distribution by sex of people having lived a minimum of 2 years in their current place of residence at the time of the 1970 census. As can be seen from the table, it is obvious that the highest proportion of male migrants is found in the republics that have traditionally low mobility rates among the native population; the Central Asian Republics, Kazakhstan, and Azerbaijan. Of the migrants from the RSFSR, the Ukraine, Byelorussia, Moldavia, Lithuania, Armenia, Estonia, and Kirghizia, the majority are women. This sex-specific migration pattern within separate regions is principally a result of developments in the economy that emphasize either male or female labor, and also of the characteristics of population mobility in these regions.

The profiles introduced in Table 19 describing the age structure of migrants show that the age distribution of those migrating to urban areas of each republic has approximately the same structure for all republics. The fraction of migrants in each age group fluctuates only slightly between migration flows.

The most mobile groups are those aged 16–25 years. The territorial redistributions in these groups are connected with the move to study in educational institutions and the attraction of newly developed regions and new building projects.

### *2.4 Age Composition**

The history of demographic development in the USSR during the past several decades has been characterized by a gradual decrease in the fraction of children in the total population and an increase in the fraction of the pension-age population** (Table 20). This "aging" process is taking place as a consequence of the lowering of the birth rate, especially evident in the postwar years.

The decline in the birth rate has had a profound effect on the age composition of the population of the Soviet Union. The enormous human losses during World War II must also be considered, however (Figure 11). According to the 1959 census, the war primarily reduced the number of people in the 35–44 age groups, but an effect was also seen in the number of 10–14-year-olds (born in 1944–1948) and 15–19-year-olds (born in 1939–1943). The base of

*This section is taken largely from the results of research conducted by Kalinjuk (1975).
**Pension age in the USSR begins at 55 for women and 60 for men.

TABLE 18 The distribution of the population by sex (in percent) according to the previous place of residence for persons whose last move occurred at least 2 years before the 1970 census.

| Previous place of residence | Men | Women |
|---|---|---|
| RSFSR | 49.5 | 50.5 |
| Ukrainian SSR | 49.0 | 51.0 |
| Moldavian SSR | 47.7 | 52.3 |
| Byelorussian SSR | 47.8 | 52.2 |
| Uzbek SSR | 53.0 | 47.0 |
| Kirghiz SSR | 47.1 | 52.9 |
| Tadzhik SSR | 52.9 | 47.1 |
| Turkmen SSR | 58.1 | 41.9 |
| Kazakh SSR | 52.5 | 47.5 |
| Georgian SSR | 50.0 | 50.0 |
| Azerbaijan SSR | 58.5 | 41.5 |
| Armenian SSR | 48.4 | 51.6 |
| Estonian SSR | 49.9 | 50.1 |
| Latvian SSR | 50.4 | 49.6 |
| Lithuanian SSR | 48.9 | 51.1 |

SOURCE: Adapted from Khorev and Chapek (1978), p. 76.

a population age pyramid in 1959 is significantly narrower than one of the prewar period. The fall in child mortality was largely reflected in the greater number of surviving boys. The part of the pyramid relating to the female population has a narrower base.

With respect to the reproductive potential, these pyramids are of two different types. The female population of 1959 relates to a stationary type, whereas the male population still relates to a growing one, characterized by a high fraction of children and low fraction of population older than 60 (Figure 12). By 1970, the age structure had undergone substantial changes. The war was largely responsible for the decline in the number aged 50–54 years as well as the fall in the 20–24 age group (those born in 1945–1949) and the 25–29 age group (those born in 1940–1944). Table 20 shows that in 1970 the share of the population aged 20–39 dropped significantly, thus causing a decrease in the relative size of the working-age population. In 1959, the 15–59 age groups made up 61.1 percent of the population, while in 1970 their share dropped to 59.3 percent. At the same time, the fraction of the population older than 60 increased.

A basic feature of the change in the age structure of the postwar population is that the increase in the number of people in the older age groups is greater than total population growth. This aging process also affects the working-age population (Table 21): the share of older people capable of working has

TABLE 19 Age distribution of in-migrants to urban areas of each republic, 1973 (in percent).

| Republic | Age group | | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–4 | 5–9 | 10–14 | 15–19 | 20–24 | 25–29 | 30–34 | 35–39 | 40–44 | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 | 70+ | |
| RSFSR | 3.44 | 2.46 | 2.53 | 21.85 | 33.27 | 12.02 | 5.57 | 6.06 | 3.34 | 2.85 | 1.39 | 1.13 | 1.59 | 1.16 | 1.54 | 100.0 |
| Ukrainian SSR | 4.26 | 3.04 | 3.03 | 23.52 | 32.25 | 11.67 | 5.58 | 5.33 | 2.52 | 2.40 | 1.24 | 1.04 | 1.46 | 1.06 | 1.54 | 100.0 |
| Moldavian SSR | 3.54 | 2.54 | 2.90 | 28.16 | 33.14 | 10.18 | 5.04 | 4.45 | 2.57 | 2.18 | 1.37 | 0.81 | 1.12 | 0.81 | 1.18 | 100.0 |
| Byelorussian SSR | 4.44 | 3.12 | 3.09 | 26.81 | 33.28 | 11.41 | 4.62 | 4.36 | 2.31 | 1.95 | 0.88 | 0.66 | 1.00 | 0.77 | 1.18 | 100.0 |
| Uzbek SSR | 3.37 | 2.41 | 1.86 | 20.96 | 33.64 | 13.16 | 5.94 | 5.84 | 3.21 | 2.76 | 1.34 | 1.14 | 1.19 | 0.89 | 1.22 | 100.0 |
| Kirghiz SSR | 5.22 | 3.78 | 2.84 | 21.64 | 30.83 | 11.85 | 5.30 | 5.67 | 3.29 | 3.13 | 1.62 | 1.18 | 1.31 | 0.95 | 1.35 | 100.0 |
| Tadzhik SSR | 3.49 | 2.52 | 1.82 | 20.85 | 33.62 | 12.29 | 6.49 | 6.37 | 3.42 | 2.92 | 1.41 | 1.02 | 1.29 | 0.94 | 1.25 | 100.0 |
| Turkmen SSR | 4.35 | 2.96 | 1.95 | 15.98 | 35.22 | 14.15 | 6.91 | 7.16 | 3.64 | 3.06 | 1.35 | 0.94 | 0.91 | 0.61 | 0.82 | 100.0 |
| Kazakh SSR | 4.47 | 3.33 | 2.75 | 20.50 | 32.41 | 11.66 | 5.62 | 6.17 | 3.23 | 2.94 | 1.53 | 1.19 | 1.49 | 1.12 | 1.53 | 100.0 |
| Georgian SSR | 1.92 | 1.67 | 1.62 | 13.09 | 25.32 | 16.79 | 9.93 | 8.61 | 6.01 | 5.08 | 3.64 | 2.52 | 1.40 | 0.98 | 1.40 | 100.0 |
| Azerbaijan SSR | 2.00 | 1.51 | 1.54 | 30.88 | 37.08 | 11.83 | 3.91 | 7.09 | 2.18 | 1.71 | 0.78 | 0.56 | 0.71 | 0.50 | 0.71 | 100.0 |
| Armenian SSR | 2.93 | 2.22 | 1.70 | 17.60 | 38.62 | 13.40 | 5.10 | 5.64 | 3.36 | 2.89 | 1.46 | 0.94 | 1.26 | 0.96 | 1.48 | 100.0 |
| Estonian SSR | 4.92 | 3.64 | 3.81 | 20.58 | 31.26 | 11.93 | 5.50 | 4.89 | 2.99 | 2.31 | 1.30 | 1.07 | 1.79 | 1.51 | 2.49 | 100.0 |
| Latvian SSR | 4.47 | 3.64 | 4.18 | 20.98 | 27.86 | 11.47 | 6.76 | 5.37 | 3.41 | 2.78 | 1.56 | 1.12 | 1.98 | 1.66 | 2.75 | 100.0 |
| Lithuanian SSR | 5.09 | 3.84 | 4.23 | 22.45 | 27.33 | 11.99 | 6.44 | 4.68 | 3.04 | 2.18 | 1.27 | 0.98 | 2.12 | 1.62 | 2.49 | 100.0 |

SOURCE: Adapted from Central Statistical Office (1975), pp. 190, 191.

TABLE 20 Evolution of the age composition of the male and female populations of the USSR, 1939–1974 (in percent).

| Age group | 1939 | | 1959 | | 1970 | | 1974 | |
|---|---|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female | Male | Female |
| 0–19 | 46.4 | 42.8 | 42.2 | 33.6 | 42.1 | 34.6 | 40.2 | 33.5 |
| 20–39 | 33.4 | 32.6 | 34.1 | 32.3 | 30.5 | 26.5 | 30.7 | 26.8 |
| 40–59 | 14.6 | 16.8 | 16.6 | 22.7 | 19.1 | 24.0 | 20.3 | 23.5 |
| 60+ | 5.6 | 7.8 | 7.1 | 11.4 | 8.3 | 14.9 | 8.8 | 16.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

SOURCE: Kalinjuk (1975).

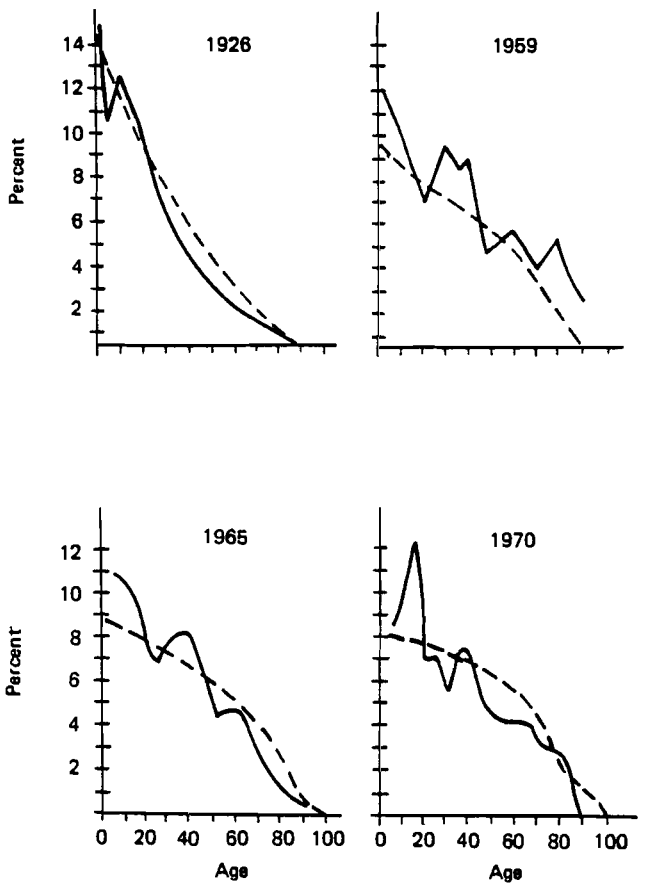


FIGURE 11 Age composition of observed (—) and stable equivalent (- - -) populations of the USSR: 1926, 1959, 1965, and 1970. Source: Kalinjuk (1975).

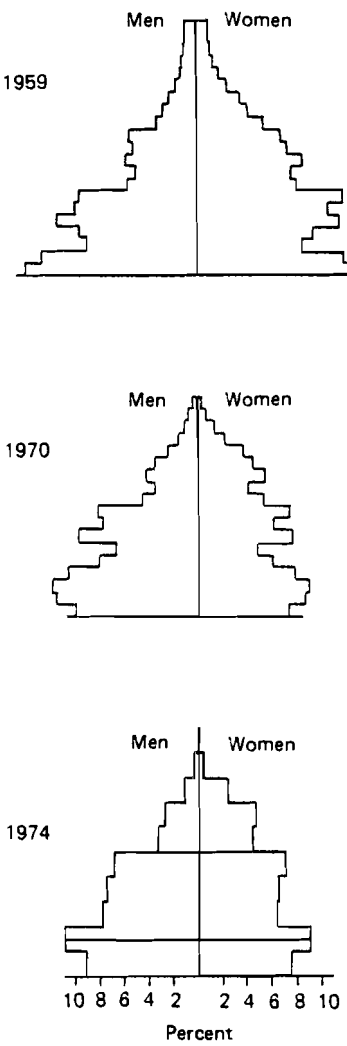


FIGURE 12 Age pyramids for the USSR population in 1959, 1970, and 1974 (in percent). Source: Kalinjuk (1975).

increased, while the share of the younger 20–39 age groups has declined. (After 1970, however, this tendency was checked somewhat by the entry to the labor market of a large number of youths born in 1955–1959.) Together with the fall of the share of children, the share of females over 60 years of age has increased. In 1974, the fraction of women aged 60 or older was almost twice that of men of this age.

The aging process of males of working age is different from that of females. Thus in 1970, the fraction of men aged 16–39 years surpassed the prewar and

TABLE 21 Evolution of the age composition of the population of working age, 1939–1970 (in percent).

| Age group | 1939 | 1959 | 1970 |
|---|---|---|---|
| 15–19 | 15.6 | 12.9 | 15.4 |
| 20–29 | 32.1 | 30.2 | 21.6 |
| 30–39 | 26.1 | 24.0 | 26.2 |
| 40–49 | 15.8 | 17.8 | 22.2 |
| 50–59 | 10.4 | 15.1 | 14.6 |
| 15–59 | 100.0 | 100.0 | 100.0 |

SOURCE: Kalinjuk (1975).

TABLE 22 Evolution of the age composition of the male population of working age, 1939–1974 (in percent).

| Age group | 1939 | 1959 | 1970 | 1974 |
|---|---|---|---|---|
| 20–29 | 44.1 | 39.8 | 28.0 | 30.7 |
| 30–39 | 36.5 | 27.5 | 33.5 | 29.5 |
| 40–49 | 5.3 | 18.2 | 24.5 | 27.3 |
| 50–59 | 14.1 | 14.5 | 14.0 | 12.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

SOURCE: Kalinjuk (1975).

1959 levels by comprising 50 percent of the total number of men capable of working (Table 22). By 1974, both the male and female populations of working age were growing "younger": the share of those between the ages of 20 and 29 grew, while the share of those between 50 and 59 declined. Nevertheless, the aging tendency of the working-age population has been sustained, and women have held the "advantage" in the overall process of population aging.

Aging of the female population also affects the fertility rates in the country. An increase in the number of women in the older age groups leads to a decline in the size of the actively reproducing cohort and consequently in the birth rate. In the 1959–1970 period, the number of women in the 15–29 age group dropped from 27.8 million to 26.2 million, and their share in the total number of women of reproductive age dropped from 47 percent to 41.6 percent. Even larger was the drop in the number of women in the 20–29 age group. During this same period, their number dropped from 18.6 million to 15.4 million, and the share of this age group in the total number of women of reproductive age declined from 33.1 percent to 24.5 percent.


FIGURE 13 Age pyramids for the urban and rural populations of the USSR according to the 1970 census (in percent). Source: Kalinjuk (1975).

Figure 13 illustrates the difference in age compositions between urban and rural populations. The urban population of the USSR is characterized by a rather high share of elderly and middle-aged people, which in the period between the 1959 and 1970 censuses increased by 32 percent and made up 10.3 percent as opposed to 7.8 percent of the total population. The fraction in the 0–14 age group dropped to 25.6 percent. The fraction of population of working age (those in the 20–59 age group) also dropped. In 1959 this age group made up 57.4 percent of the population; by 1970 this figure had fallen to 54.9 percent. Nevertheless, the fraction of urban population that is of working age remains sufficiently high. A population in which the fractions of children, middle-aged, and elderly people are comparatively low but the fraction of population of working age is much higher is structured as a result of heavy migration between city and country.

In rural areas the proportion of people in the 0–14 age group remains rather high, as do those in the middle-aged and elderly groups. At the same time, the fraction of the working-age population gradually decreases.

When the total population is analyzed by region, substantial differences in the age structure become evident (Table 23). For the Central Asian Republics and Azerbaijan in 1970, around 50 percent of the population is younger than 14–19 years of age. The share of the younger age groups (0–19) is within the 51–55 percent range of the total population, and the fraction of the basic working-age group (20–59 years) lies in the 37–40 percent range. The number in the 60 and over age group is declining and accounts for approximately 7–9 percent of the total population.

Around 80 percent of the total USSR population, represented by the Russian Federation (RSFSR), the Ukraine, Byelorussia, Kazakhstan, Moldavia, Georgia, and Armenia, has a stationary age composition. The share of younger age groups is 33–49 percent, the share of the working-age population is 42–53 percent, and the share of middle-aged and elderly people has gradually been increasing to 8–14 percent.

TABLE 23 Evolution of the population of the basic age groups for each republic, 1959–1970 (in percent).

| Republic | 0–19 years | | 20–59 years | | 60+ years | |
|---|---|---|---|---|---|---|
| | 1959 | 1970 | 1959 | 1970 | 1959 | 1970 |
| RSFSR | 36.8 | 35.9 | 54.2 | 52.2 | 9.0 | 11.9 |
| Ukrainian SSR | 34.3 | 33.1 | 55.2 | 53.0 | 10.5 | 13.9 |
| Moldavian SSR | 41.9 | 41.8 | 50.4 | 48.5 | 7.7 | 9.7 |
| Byelorussian SSR | 38.2 | 37.5 | 51.1 | 49.4 | 10.7 | 13.1 |
| Uzbek SSR | 45.8 | 54.2 | 44.8 | 37.1 | 9.4 | 8.7 |
| Kirghiz SSR | 44.6 | 51.2 | 45.7 | 39.9 | 9.7 | 8.9 |
| Tadzhik SSR | 46.6 | 55.6 | 45.5 | 36.9 | 7.9 | 7.5 |
| Turkmen SSR | 46.0 | 54.3 | 46.1 | 38.5 | 7.9 | 7.2 |
| Kazakh SSR | 43.9 | 47.3 | 48.3 | 44.4 | 7.8 | 8.3 |
| Georgian SSR | 37.6 | 39.1 | 52.5 | 49.1 | 9.9 | 11.8 |
| Azerbaijan SSR | 45.0 | 53.2 | 46.6 | 38.8 | 8.4 | 8.0 |
| Armenian SSR | 44.7 | 49.2 | 47.3 | 42.6 | 8.0 | 8.2 |
| Estonian SSR | 29.9 | 29.5 | 55.0 | 53.7 | 15.1 | 16.8 |
| Latvian SSR | 29.9 | 28.6 | 55.1 | 54.1 | 15.0 | 17.3 |
| Lithuanian SSR | 35.6 | 34.5 | 52.5 | 50.6 | 11.9 | 14.9 |

SOURCE: Adapted from Kalinjuk (1975).

Finally, the Baltic Republics exhibit their own type of age composition. Approximately half of the total population is older than 30–34 years of age. On the average, the fraction of children consists of 30 percent, and the fraction of middle-aged and elderly people in the population is the highest in the USSR at 17.3 percent.

## 3 MULTIREGIONAL POPULATION ANALYSIS

Multiregional population analysis serves as an instrument for estimating the dynamics of interregional population change. Along with traditional indices showing the demographic development of an individual region, this analysis permits one to estimate the population characteristics that can be calculated only by taking into account the entire system of regions. These characteristics include:

1. The probability that an individual in a particular age group of the population in a given region will reach the next age group and stay or move to any other region.
2. The probability that a female in a particular reproductive age group in a given region will give birth to a child in the same or another region.
3. The expected number of migrations that an inhabitant of a given region will make during a lifetime out of each region in the system.

4. The expected number of births in each region according to the birthplace of the parent.
5. The contribution to total births in each region arising as a result of changes in population structure due to migration.
6. The mean age of migrants moving from region $i$ to region $j$ and other related demographic characteristics.

The methods, algorithms, and computer programs for the multiregional demographic analysis reported here were elaborated at IIASA under the leadership of Andrei Rogers and are described in Rogers (1968, 1975), Willekens and Rogers (1976, 1977, 1978), Willekens (1977, 1978), and Ledent (1978).

### *3.1 Data Preparation*

The analysis of fertility, mortality, age–sex composition, and migration in the USSR presented in the first part of this work showed that there are considerable differences in the demographic characteristics of the individual union republics. The choice of a republic as a spatial unit was dictated by the lack of necessary demographic data on smaller regions of the country.

Taking into consideration the difficulties of obtaining information, the relative homogeneity of demographic development in the union republics, and their territorial proximity, we aggregated the 15 republics into seven territorial regions, all of which were further divided into urban and rural areas for the purposes of a more detailed analysis.

The urban areas of each of the seven regions were defined as independent territorial units, whereas all rural areas were aggregated into a single eighth region because of the absence of age-specific data on rural-to-rural migration between republics. Thus, the following eight regions (Figure 14) were defined:

I Urban areas of the Russian Federal Republic (the RSFSR)
II Urban areas of the Ukrainian and Moldavian SSRs
III Urban areas of the Byelorussian SSR
IV Urban areas of the Central Asian Republics except the Kazakh SSR (the Uzbek, Kirghiz, Tadzhik, and Turkmen SSRs)
V Urban areas of the Kazakh SSR
VI Urban areas of the Caucasian Republics (the Georgian, Azerbaijan, and Armenian SSRs)
VII Urban areas of the Baltic Republics (the Estonian, Latvian, and Lithuanian SSRs)
VIII All rural areas of the USSR

In addition to our division into eight territorial regions, we made an aggregation involving only two regions, with all rural areas as one region and all urban areas as the other region. For this aggregation we maintained the number VIII

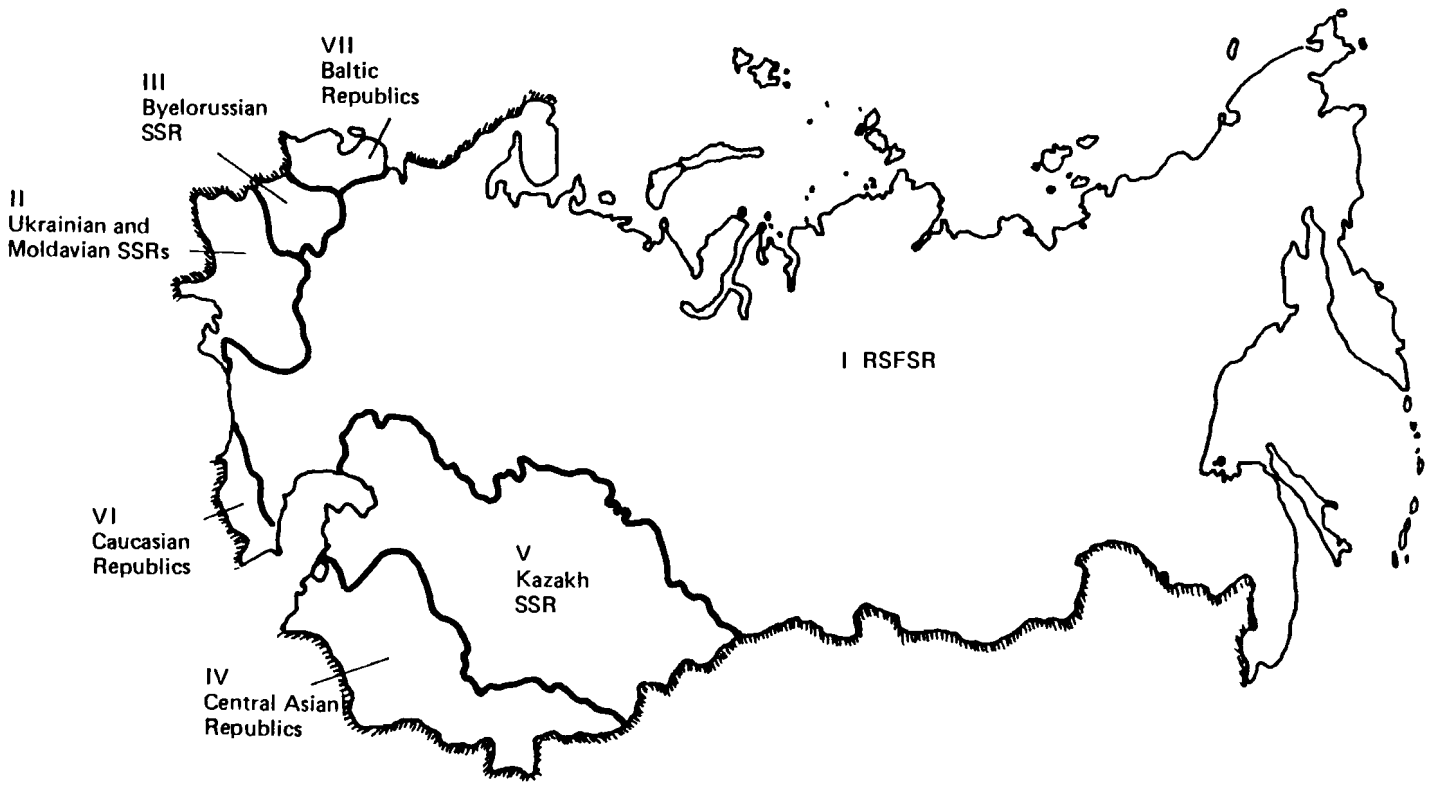


FIGURE 14 The seven urban regions used in the multiregional analysis of the USSR.

for the rural areas of the USSR and identified all the urban areas together as region IX.

For the USSR multiregional population analysis, the following 1974 input data, with both sexes added together, were used for each region of the observed territorial system:

1. Population by age and region at mid-year
2. Number of deaths by age and by region
3. Number of births by age of parent and by region
4. Number of migrants by age, region of origin, and region of destination

The base year for our study was 1974. The data on population by age groups (from the beginning of 1970 through 1974) and for births, deaths, and migrations (1973–1974) were compiled from the nation's official statistics (Central Statistical Office 1973, 1974, 1975), supplemented by other statistical sources.

The population distribution in individual regions was disaggregated into 5-year age groups, the last including people of 70 years and over. However, for the purposes of this study, it was believed to be important to include the age distribution in older age groups – between the ages of 70 and 85.

Because of a lack of USSR information for these groups in 1974, we used 1974 age profiles obtained in Poland for all eight regions. These data were acceptable because the age structure and mortality patterns in the older age groups of the USSR and Poland in 1970 are believed to be similar. The age-specific mortality rates were recorded according to 5-year age groups between the ages of 0 and 70. For the age-specific mortality rates in the older age groups (70–74, 75–79, 80–85, 85 and over), data obtained in Poland were used.

Age-specific migration rates were calculated from data on the total in-migration to the urban areas of each republic of the USSR (for urban regions), and the migration rate of the rural population for the USSR as a whole. Age-specific migration rates for the older age groups (70–85 years of age) were assumed to follow the age profile of corresponding rates for Poland.

All preliminary information for the urban areas was collected separately in each union republic, while the data for rural areas were collected for the USSR as a whole. In the final stage of preparation, the aggregation of republics was carried out as shown above, with an eight-region aggregation and an urban/rural dimension.

### *3.2 Analysis of Observed Population Characteristics*

Appendix A presents the mortality rates, fertility rates, and migration rates for all regions in the system, including both the eight-region and the two-region divisions. Along with the observed 5-year age-specific death, birth, and migration rates are included other rates, for example, the gross and crude

mortality, fertility, and out-migration rates, as well as the mean ages of death, childbearing, and out-migration.

The crude rate, defined as the total number of births, deaths, or out-migrants divided by the total mid-year population, characterizes the aggregate level of births, deaths, and out-migrations. Thus, the *crude death rate* (CDR) for urban areas of the RSFSR is estimated to be 0.0083 (or 8.3 per thousand) and 0.0079 for the urban areas of the Ukrainian Republic. The lowest CDR occurs in the urban areas of Byelorussia and the highest in the rural areas of the country.

The *gross death rate* (GDR), the sum of the age-specific death rates times five, ranges between 2.01 and 2.34 in the eight regions. The analogously calculated measure for fertility, the *gross fertility rate* (GFR) is five times the sum of the age-specific fertility rates. This rate is also known as the *gross reproduction rate* (GRR), when only female births are used in computing age-specific fertility rates for the female population.

The GRR reflects the level of population reproduction in the various regions, giving an indication of the number of babies each woman will have during her reproductive period without taking into account the effects of mortality and migration. Appendix A presents data on GRRs for all regions. Gross reproduction rates significantly greater than unity indicate a population that replaces itself, but since migration and mortality need to be taken into account, the reproductive behavior of regional populations needs to be examined using *net reproduction rates* (NRR).

Analogous to the GRR is the *gross migraproduction rate* (GMR). It is an index of the migration level between two regions and is the sum of age-specific migration rates multiplied by five, in the case of 5-year age intervals. With it, one can compare the total level of out-migration from one region with that of another at a certain period of time; it is a period and not a cohort index.

Table 24 shows the results of GMR calculations for each region. As is apparent from the table, the total GMR is highest for regions V (6.792), III (5.957), VIII (5.696), and I (5.544). By comparing the data in the columns of this table, it is possible to analyze the interregional migration relationships. For example, the "strongest" links of region I are with region VIII, and the strongest links of region VI are with region I.

The elements of this table arranged on the main diagonal ($GMR_{ii}$) represent intraregional migration indexes. The highest level of such migrations occurs in region I with a 4.169 index, more than 75 percent of the total. The level of intraregional migration is of course related to the size of a given region. However, in region VIII, a rather large region, the migration level is only 2.162. The lowest level is observed in region VI.

Once these intraregional flows have been excluded, one can estimate the level of interregional streams. The GMRs representing migration from the rural areas (VIII) to the other regions are among the highest in the country. For

TABLE 24 Gross migraproduction rates (including intraregional migration) for the eight regions of the USSR, 1974.

| Region of destination[a] | Region of out-migration | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| I RSFSR | 4.169 | 0.790 | 0.925 | 0.883 | 1.553 | 0.538 | 0.505 | 2.157 |
| II Ukrainian and Moldavian SSRs | 0.282 | 3.427 | 0.279 | 0.117 | 0.286 | 0.134 | 0.128 | 0.664 |
| III Byelorussian SSR | 0.037 | 0.036 | 3.632 | 0.012 | 0.035 | 0.011 | 0.054 | 0.161 |
| IV Central Asian Republics | 0.085 | 0.033 | 0.031 | 2.441 | 0.275 | 0.047 | 0.015 | 0.164 |
| V Kazakh SSR | 0.113 | 0.056 | 0.053 | 0.224 | 3.558 | 0.028 | 0.017 | 0.198 |
| VI Caucasian Republics | 0.022 | 0.018 | 0.011 | 0.019 | 0.017 | 1.776 | 0.008 | 0.071 |
| VII Baltic Republics | 0.037 | 0.028 | 0.155 | 0.012 | 0.018 | 0.012 | 3.465 | 0.116 |
| VIII Rural areas of the USSR | 0.797 | 0.792 | 0.869 | 0.859 | 1.048 | 0.289 | 0.842 | 2.162 |
| Total | 5.543 | 5.179 | 5.955 | 4.567 | 6.790 | 2.835 | 5.034 | 5.693 |

[a]Only urban areas are included in regions I–VII.
SOURCE: Appendix A.

example, we have a GMR of 2.157 directed toward region I, 0.664 toward region II, and 0.161 toward region III.

It is interesting to analyze the correlations between GMRs connecting each pair of selected regions, particularly between symmetrical origin–destination pairs. Such analyses permit one to estimate the relative "attractiveness" of one region in comparison with another. Thus, for example, the migration level from region I to region III is 0.037, but the reverse flow shows a migration level of 0.925. Residents in rural areas exhibit a strong migration association with region I. As has been pointed out above, in the rural areas of the country, there was a GMR of 2.157 into the urban areas of the RSFSR in 1974. This level is considerably higher than the reverse GMR, which is only 0.797. The comparison of analogous rates *in all other regions*, however, indicates that the GMRs from urban areas are greater than the corresponding GMRs from rural areas.

The most striking differences in migration levels are between regions VIII and V, VIII and III, and VIII and IV. For example, the level of migration from region VIII to region V is 0.198, the level of the reverse flow is 1.048. The corresponding relationship between regions VIII and IV is 0.164

versus 0.859 and between regions VIII and III it is 0.161 versus 0.869. Although it is interesting to compare the various region-specific levels with each other, the choice of territorial aggregation, which in this study results in vast differences in the dimensions of the regions, is of great importance in interpreting the results. A further disaggregation of region VIII would make it possible to carry out a more accurate study. However, such data are not currently available.

The mean age is an important demographic indicator characterizing the peculiarities of an age profile. As Table 25 shows, the population of region VII (urban areas of the Baltic Republics) has the highest mean age among the eight regions of the USSR. The mean age of the population in this region is 34 years. Other regions with a high mean age are regions II (33.96 years) and I (33.84 years). As the previous description of demographic trends in the country's individual regions showed, the high level of the mean age of the population, typical for these regions, is the result of low birth rates over a long period of time.

The lowest mean age is exhibited by the urban populations of the Central Asian and Caucasian Republics, where high birth rates have existed for a long period of time. The difference between the highest and the lowest levels of mean ages among the country's regions is 6.29 years.

The younger mean ages of the people living in the urban regions of the Central Asian and Caucasian Republics have left their mark on the mean ages of the mortality schedule. The mean age of mortality for each of these regions lies between 74.4 and 76.6 years – the lowest mean death age in the country. By contrast, in the urban areas of the Baltic, Ukrainian, and Moldavian Republics, where the proportion of the population in the younger age groups is low, the corresponding mean ages of mortality are the highest in the USSR (77.3–77.4 years).

Table 25 also gives the mean ages of childbearing by region. It is interesting to note that the highest mean ages of childbearing are found in the urban areas of the Central Asian Republics and the rural areas of the country. This may be explained by reproduction patterns in these regions: the longer reproductive period and the increased number of "third" childbirths.

The mean ages of out-migration schedules for the country as a whole range between 27.0 and 38.8 years (Table 25). The lowest mean age is typical for migration out of the rural areas of the country. Thus, the mean ages of the out-migration schedules from the rural region to the urban areas of the RSFSR, the Ukrainian and Moldavian Republics, and the Byelorussian Republic are 29.4 years, 28.7 years, and 27.0 years, respectively.

On the whole, the mean age of the out-migration schedule from the rural to the urban areas is 29.2 years, and from the urban to the rural areas is 32.4 years. Urban areas of the Central Asian Republics, which have the youngest age structure, are characterized by the highest mean age of out-migration.

TABLE 25 Mean ages of the population and of the schedules of age-specific rates of fertility, mortality, and out-migration for the nine regions of the USSR, 1974.

| Region of residence[a] | Mean age of | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Population | Fertility schedule | Mortality schedule | Out-migration schedule (Region of destination) | | | | | | | | |
| | | | | I | II | III | IV | V | VI | VII | VIII | IX |
| I RSFSR | 33.84 | 26.07 | 76.28 | – | 30.88 | 28.49 | 30.66 | 31.58 | 31.28 | 34.27 | 31.99 | – |
| II Ukrainian and Moldavian SSRs | 33.96 | 26.08 | 77.29 | 31.42 | – | 28.12 | 30.30 | 31.19 | 31.36 | 33.94 | 31.51 | – |
| III Byelorussian SSR | 30.67 | 26.56 | 77.31 | 35.05 | 34.03 | – | 33.72 | 35.06 | 33.90 | 38.61 | 35.13 | – |
| IV Central Asian Republics | 27.71 | 28.33 | 74.42 | 35.61 | 34.71 | 32.19 | – | 35.53 | 32.88 | 38.33 | 35.65 | – |
| V Kazakh SSR | 29.48 | 27.14 | 75.38 | 35.69 | 34.56 | 31.68 | 34.17 | – | 34.06 | 38.83 | 35.75 | – |
| VI Caucasian Republics | 29.89 | 27.09 | 76.60 | 34.04 | 33.18 | 30.96 | 32.19 | 34.22 | – | 37.45 | 34.09 | – |
| VII Baltic Republics | 34.00 | 26.75 | 77.38 | 30.89 | 29.76 | 27.54 | 30.46 | 30.51 | 29.67 | – | 30.99 | – |
| VIII Rural areas of the USSR | 32.83 | 27.40 | 75.53 | 29.43 | 28.66 | 27.00 | 28.76 | 29.36 | 28.25 | 31.06 | – | 29.17 |
| IX Urban areas of the USSR | 33.02 | 26.41 | 76.40 | – | – | – | – | – | – | – | 32.44 | – |

[a]Only urban areas are included in regions I–VII.
SOURCE: Appendix D.

Thus, the mean ages of the out-migration schedules from the Kazakh urban areas to regions I, VIII, and VII are 35.7 years, 35.8 years, and 38.8 years, respectively.

The mean number of years expected to be lived by an individual beyond a given age is known as the *life expectancy*. If it is supposed that the individual will stay in a given region from birth until death, then conventional single-region demographic calculations may be used to obtain the life expectancies set out in Table 26. The last two columns of this table give expectancies for the total urban population (region IX) and the population of the USSR as a whole.

Apart from the indices given above, Appendix D gives data on the single-region net reproduction rates and net migraproduction rates. Figure 15 shows the regional distribution of the single-region NMR. As the figure shows, the NMR for the combined urban areas of the USSR is 4.67. A similar level is also recorded for the urban areas of the Ukrainian and Moldavian Republics. The NMRs of regions VI, IV, and VII (the urban areas of the Caucasian, Central Asian, and Baltic Republics, respectively) are below the national average, and the NMRs of regions I, VIII, III, and V (the urban areas of the RSFSR, the rural areas of the USSR, and the urban areas of the Byelorussian and Kazakh Republics, respectively) are above the national average. The lowest NMR (2.52) is exhibited by region VI, and the highest by region V (5.72).

## *3.3 The Multiregional Life Table*

The life table is an important model in demographic analysis. Such indices as probability of survival, number of survivors, and life expectancy make it possible to observe the evolution of a hypothetical cohort born at some fixed moment in time. The method of calculating a single-region life table is well known and is widely used in different countries of the world.

The multiregional life table is a generalization of the concept of the single-region life table. Its main distinguishing feature is the fact that one is able to model each region as an open territorial subsystem experiencing in- and out-migration flows.

The method used to construct these multiregional tables was developed by Rogers and is described in Rogers (1975), and Willekens and Rogers (1978). It is initiated with the estimations of age-specific death and migration probabilities for each region, and these are then applied to hypothetical cohorts born in different regions. These probabilities are derived from observed mortality and migration rates.

### 3.3.1 MULTIREGIONAL MIGRATION AND DEATH PROBABILITY MATRICES

The death and migration probabilities make it possible to estimate the probabilities that individuals at given ages reach subsequent ages and stay in a given

TABLE 26 Single-region life expectancies by age for the nine regions of the USSR, 1974.

| Age | Regions I | II | III | IV | V | VI | VII | VIII | IX | Total USSR |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 69.44 | 71.49 | 73.49 | 68.27 | 68.55 | 71.51 | 71.70 | 68.24 | 69.90 | 69.32 |
| 5 | 67.39 | 68.47 | 70.25 | 68.09 | 66.85 | 69.60 | 68.31 | 66.44 | 67.80 | 67.38 |
| 10 | 62.59 | 63.63 | 65.36 | 63.31 | 62.05 | 64.79 | 63.43 | 61.47 | 62.99 | 62.59 |
| 20 | 52.99 | 53.95 | 55.62 | 53.73 | 52.51 | 55.10 | 53.79 | 52.24 | 53.37 | 53.04 |
| 30 | 43.97 | 44.62 | 46.22 | 44.68 | 43.61 | 45.71 | 44.53 | 43.70 | 44.26 | 44.09 |
| 40 | 35.13 | 35.62 | 37.06 | 35.88 | 34.92 | 36.45 | 35.54 | 35.18 | 35.36 | 35.32 |
| 50 | 26.99 | 27.17 | 28.45 | 27.88 | 26.92 | 27.94 | 27.18 | 27.38 | 27.13 | 27.26 |
| 60 | 19.35 | 19.39 | 20.70 | 20.45 | 19.63 | 20.18 | 19.59 | 19.93 | 19.48 | 19.68 |
| 70 | 12.55 | 12.52 | 13.59 | 13.79 | 13.03 | 13.26 | 12.52 | 12.69 | 12.66 | 12.67 |
| 80 | 7.52 | 7.50 | 8.38 | 8.55 | 7.91 | 8.11 | 7.49 | 7.64 | 7.61 | 7.62 |
| 85 | 5.87 | 5.84 | 6.68 | 6.85 | 6.24 | 6.42 | 5.84 | 5.97 | 5.95 | 5.96 |

SOURCE: Appendix D.

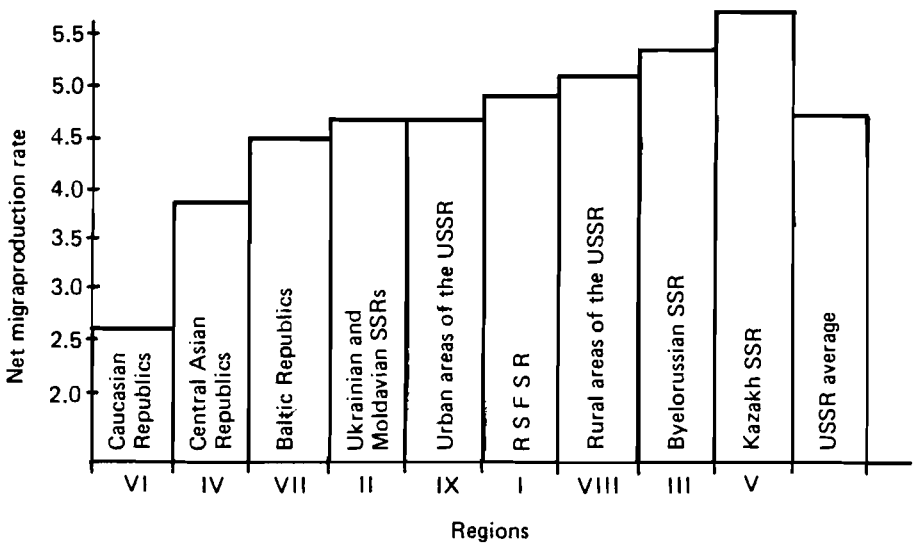


FIGURE 15 Regional distribution of the (single-region) net migraproduction rates (only urban areas are included in regions I–VII), USSR, 1974. Source: Appendix B.

region or move to any other region. The results of the calculations to determine probabilities of dying or migrating are given in Appendix B. It shows, for example, the probability that a person born in region I will be found 5 years later in region II is 0.013, in region III is 0.002, and in the rural areas of the country is 0.029.

The probability that a person aged 20 residing in region I will still be in that region at the age of 25 is 0.750. The probability of a migration to region II is 0.061, to region III is 0.010, and so on. The probability of remaining in the same region for 5 years is much higher at older ages; for example, it is 0.917 at the age of 50.

Tables 27 and 28 give the death and migration probabilities for the two ages with the highest average mobility, 20 and 25. For 20-year-olds (Table 27) the out-migration probability is lowest in regions I and VI. The probability of staying in the same region for 5 years is between 0.75 and 0.76. In the 20–24 age group, the mobility of the rural population of the country is the highest. The probability of staying in the place of birth is only 0.26.

The mobility of people aged 25 is slightly lower than that of 20-year-olds for all regions (Table 28). The lowest mobility is observed in the urban areas of the Baltic Republics (region VII), the Caucasian Republics (region VI), and the RSFSR (region I). The highest mobility at the age of 25 is shown by the population of the rural areas, though the probability of staying in the region of birth is almost twice as high as at age 20. The data clearly show the migration patterns between the individual regions.

For region III (the urban areas of the Byelorussian SSR) in the 20–24 age group, the strongest migration links are evident with the urban areas of the RSFSR, the rural areas of the country, and the urban areas of the Ukrainian and Moldavian Republics. Region V (the urban areas of the Kazakh Republic) also has strong links with these three regions.

The analysis of the death and migration probabilities for the individual age groups within the two-region urban–rural system is also interesting. As is apparent from Appendix B, in almost all age groups the mobility of the urban population is lower than that of the rural population. Thus the probabilities of the urban population staying in urban regions between the ages 15–19 and 20–24 are 0.90 and 0.88, respectively; for the rural population staying in rural regions the corresponding figures are 0.58 and 0.26. For every 100 000 people living in urban areas at the age of 20, only 11.5 thousand will have moved to rural areas by the age of 24, but the flow from rural to urban areas constitutes 72.5 thousand people. There are large discrepancies in the size of in and out flows in all age groups. These data confirm clearly the unequal character of urban–rural population exchange in the individual age groups.

### 3.3.2 THE LIFE HISTORY OF THE INITIAL COHORTS

The above examination of the age-specific probabilities of dying and out-migrating permits one to estimate the life histories of the cohorts born in each

TABLE 27 Five-year death and migration probabilities for people of age 20 in the eight regions of the USSR, 1974.

| Region of destination[a] | Region of origin | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| I RSFSR | 0.75033 | 0.19097 | 0.18555 | 0.19346 | 0.27054 | 0.12369 | 0.14707 | 0.44102 |
| II Ukrainian and Moldavian SSRs | 0.06163 | 0.63138 | 0.05731 | 0.03701 | 0.06009 | 0.03323 | 0.04106 | 0.13761 |
| III Byelorussian SSR | 0.01006 | 0.01056 | 0.59158 | 0.00614 | 0.00971 | 0.00408 | 0.01428 | 0.03348 |
| IV Central Asian Republics | 0.01907 | 0.01116 | 0.00968 | 0.58813 | 0.04338 | 0.01171 | 0.00773 | 0.03604 |
| V Kazakh SSR | 0.02158 | 0.01433 | 0.01227 | 0.03676 | 0.46497 | 0.00761 | 0.00822 | 0.03906 |
| VI Caucasian Republics | 0.00599 | 0.00563 | 0.00388 | 0.00582 | 0.00508 | 0.75972 | 0.00379 | 0.01650 |
| VII Baltic Republics | 0.00762 | 0.00685 | 0.02027 | 0.00422 | 0.00516 | 0.00314 | 0.63820 | 0.02101 |
| VIII Rural areas of the USSR | 0.11562 | 0.12259 | 0.11424 | 0.12068 | 0.13192 | 0.05148 | 0.13237 | 0.26343 |
| Migration | 0.99190 | 0.99347 | 0.99478 | 0.99222 | 0.99085 | 0.99466 | 0.99272 | 0.98815 |
| Death | 0.00810 | 0.00653 | 0.00522 | 0.00778 | 0.00915 | 0.00534 | 0.00728 | 0.01185 |
| Total | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

[a]Only urban areas are included in regions I–VII.
SOURCE: Appendix B.

TABLE 28 Five-year death and migration probabilities for people of age 25 in the eight regions of the USSR, 1974.

| Region of destination[a] | Region of origin | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| I RSFSR | 0.81526 | 0.10246 | 0.11149 | 0.12536 | 0.18552 | 0.08403 | 0.05979 | 0.27046 |
| II Ukrainian and Moldavian SSRs | 0.03978 | 0.78364 | 0.03418 | 0.02145 | 0.03837 | 0.02203 | 0.01613 | 0.08373 |
| III Byelorussian SSR | 0.00577 | 0.00507 | 0.73324 | 0.00304 | 0.00549 | 0.00227 | 0.00572 | 0.01944 |
| IV Central Asian Republics | 0.01289 | 0.00569 | 0.00536 | 0.71110 | 0.03236 | 0.00831 | 0.00283 | 0.02244 |
| V Kazakh SSR | 0.01415 | 0.00729 | 0.00681 | 0.02548 | 0.61252 | 0.00475 | 0.00284 | 0.02345 |
| VI Caucasian Republics | 0.00406 | 0.00319 | 0.00214 | 0.00358 | 0.00323 | 0.82878 | 0.00153 | 0.01025 |
| VII Baltic Republics | 0.00547 | 0.00403 | 0.01547 | 0.00263 | 0.00337 | 0.00219 | 0.83278 | 0.01513 |
| VIII Rural areas of the USSR | 0.09008 | 0.08016 | 0.08295 | 0.09509 | 0.10566 | 0.03985 | 0.06956 | 0.54044 |
| Migration | 0.98746 | 0.99153 | 0.99164 | 0.98773 | 0.98652 | 0.99222 | 0.99118 | 0.98534 |
| Death | 0.01254 | 0.00847 | 0.00836 | 0.01227 | 0.01348 | 0.00778 | 0.00882 | 0.01466 |
| Total | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

[a]Only urban areas are included in regions I–VII.
SOURCE: Appendix B.

region. A part of this life history calculation is given in Appendix B. These tables show the evolution of a cohort born in a given region. They also show regional distributions of the number of survivors reaching an exact age.

In Appendix B figures are also given for the expected number of survivors who reach exact age $x$, distributed over the two-region system of the country: urban and rural. For example, out of 100 000 people born in the urban areas of the country, 95 868 will reach the age of 5. Of this number, 93 320 people will live in urban areas and 2548 in rural areas. Out of the 100 000 population born in the urban areas of the country, 94 932 will survive to the age of 20; of this number, 83 272 people will live in the urban areas and 11 660 in the rural areas. Of the 100 000 people born in the rural areas, 95 363 will reach the age of 5; of this number, 88 095 people will live in the rural areas and 7267 in the urban areas. By the age of 20, 46 342 people out of 94 164 of this cohort will live in the urban areas and 47 822 will live in the rural areas.

A similar analysis of the number of survivors at each age was carried out for the eight-region system. Thus, for example, 94 791 people out of 100 000 born in the urban areas of the RSFSR will reach the age of 20.

Table 29 shows the probabilities of surviving to age 20 for the initial cohorts born in the eight regions of the USSR. This table clearly shows the strong and the weak migration ties of each region with all of the others.

### 3.3.3 LIFE EXPECTANCIES BY PLACE OF BIRTH

The index of life expectancy according to place of birth and future residence is an important measure in multiregional population analysis. Table 30 shows the additional number of years a person born in an urban or rural region may expect to live after exact age $x$, and the distribution of these years between urban and rural residence. These indices clearly show the difference in the mobility of the urban and rural populations. Whereas an individual born in an urban area is expected to live 60.3 years in an urban area and only 9.5 in a rural area, a person born in a rural area is expected to live 26.6 years in rural regions and the remaining 42.5 years in urban areas.

Table 31a presents life expectancies at birth by place of residence for all eight regions of the system. Thus, for example, people born in the urban areas of the RSFSR (region I) are expected to live 46.3 years out of a total of 69.5 years in the region of birth, 6.9 years in region II, 1.1 years in region III, and so on.

The main diagonal shows how many years a person born in a given region can expect to live in that region. By comparing these figures with the total life expectancy, the relative "immobility" of each regional population can be clearly identified. As is apparent from this table, the highest immobility in the USSR exists in region I (46.3 years) and in region VI (42.4 years), and the lowest in region VIII (26.7 years) and region V (22.8 years). Total regional life expectancies at birth are illustrated in Figure 16. The checkered areas represent the

TABLE 29 Probability of survival to age 20 of regional birth cohorts, by region of residence.

| Region of residence[a] | Region of birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| I RSFSR | 0.70349 | 0.17015 | 0.17732 | 0.13739 | 0.23269 | 0.09550 | 0.13492 | 0.27309 |
| II Ukrainian and Moldavian SSRs | 0.06333 | 0.62454 | 0.06081 | 0.02794 | 0.05713 | 0.02822 | 0.04130 | 0.09463 |
| III Byelorussian SSR | 0.01066 | 0.01079 | 0.55781 | 0.00467 | 0.00943 | 0.00350 | 0.01552 | 0.02419 |
| IV Central Asian Republics | 0.01671 | 0.00909 | 0.00849 | 0.61915 | 0.03735 | 0.00790 | 0.00646 | 0.02131 |
| V Kazakh SSR | 0.01992 | 0.01254 | 0.01150 | 0.02657 | 0.46756 | 0.00567 | 0.00702 | 0.02381 |
| VI Caucasian Republics | 0.00493 | 0.00443 | 0.00331 | 0.00386 | 0.00392 | 0.76006 | 0.00314 | 0.00952 |
| VII Baltic Republics | 0.00848 | 0.00731 | 0.02489 | 0.00324 | 0.00512 | 0.00275 | 0.61789 | 0.01604 |
| VIII Rural areas of the USSR | 0.12039 | 0.12448 | 0.12421 | 0.09947 | 0.12879 | 0.04555 | 0.14228 | 0.47915 |
| Total | 0.94791 | 0.96334 | 0.96833 | 0.92229 | 0.94199 | 0.94914 | 0.96852 | 0.94173 |

[a]Only urban areas are included in regions I–VII.
SOURCE: Appendix B.

TABLE 30 Life expectancy by place of birth for the urban and the rural areas of the USSR.

| | Life expectancy | | | | | |
|---|---|---|---|---|---|---|
| | Urban birth | | | Rural birth | | |
| Age | Total | Urban | Rural | Total | Urban | Rural |
| 0 | 69.72 | 60.27 | 9.45 | 69.11 | 42.54 | 26.57 |
| 5 | 67.62 | 57.83 | 9.79 | 67.35 | 44.42 | 22.93 |
| 10 | 62.80 | 53.16 | 9.64 | 62.58 | 44.08 | 18.49 |
| 15 | 57.95 | 48.53 | 9.42 | 57.75 | 43.53 | 14.22 |
| 20 | 53.21 | 44.19 | 9.01 | 53.10 | 42.18 | 10.92 |
| 25 | 48.62 | 40.18 | 8.44 | 48.69 | 39.34 | 9.35 |
| 30 | 44.17 | 36.34 | 7.83 | 44.16 | 35.70 | 8.45 |
| 35 | 39.55 | 32.41 | 7.14 | 39.55 | 31.90 | 7.65 |
| 40 | 35.33 | 28.84 | 6.49 | 35.32 | 28.41 | 6.91 |
| 45 | 30.99 | 25.21 | 5.78 | 31.00 | 24.86 | 6.13 |
| 50 | 27.17 | 22.02 | 5.15 | 27.18 | 21.74 | 5.44 |
| 55 | 23.52 | 18.99 | 4.53 | 23.53 | 18.75 | 4.77 |
| 60 | 19.56 | 15.71 | 3.85 | 19.56 | 15.52 | 4.04 |
| 65 | 15.92 | 12.71 | 3.20 | 15.92 | 12.56 | 3.35 |
| 70 | 12.65 | 10.05 | 2.60 | 12.66 | 9.94 | 2.72 |
| 75 | 9.82 | 7.76 | 2.06 | 9.82 | 7.67 | 2.14 |
| 80 | 7.61 | 5.98 | 1.63 | 7.61 | 5.91 | 1.69 |
| 85 | 5.94 | 4.64 | 1.30 | 5.95 | 4.59 | 1.35 |

populations of the urban areas of the Byelorussian, Baltic, Ukrainian, Moldavian, and Caucasian Republics, which have the highest life expectancy, while the dotted areas denote the urban populations of the Central Asian Republics (the Uzbek, Tadzhik, Turkmen, and Kirghiz SSRs), which have the lowest life expectancy.

The life expectancy index, by place of birth and future residence, is a useful measure for assessing the migration levels between individual regions. The *migration level* is defined as ${}_i\theta_j$, where ${}_i\theta_j = {}_i e_j(0)/{}_i e(0)$. This means that the migration level is the fraction of total life expectancy that a person born in region $i$ might expect to live in region $j$.

Table 31b gives migration levels among all eight regions of the USSR. The elements along the main diagonal reflect the "nonmigration" level. For example, one-third of the average lifetime of a baby born in the urban areas of the RSFSR is expected to be lived outside that region (and two-thirds within it). These fractions are reversed for a baby born in the urban areas of the Kazakh SSR.

TABLE 31 Expectations of life at birth for the eight regions of the USSR.

| Region of residence[a] | Region of birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| *a Expectation of life (years)* | | | | | | | | |
| I RSFSR | 46.3207 | 20.3948 | 20.8614 | 19.4033 | 23.9662 | 14.4872 | 17.8107 | 25.5295 |
| II Ukrainian and Moldavian SSRs | 6.9114 | 34.9208 | 6.8254 | 4.9100 | 6.6586 | 4.2853 | 5.5250 | 8.5234 |
| III Byelorussian SSR | 1.0803 | 1.0983 | 28.1539 | 0.7673 | 1.0380 | 0.5506 | 1.3320 | 1.6819 |
| IV Central Asian Republics | 1.8865 | 1.4386 | 1.3963 | 29.5788 | 2.9535 | 1.2747 | 1.2171 | 2.1168 |
| V Kazakh SSR | 1.8067 | 1.4543 | 1.4065 | 2.3306 | 22.7975 | 0.9310 | 1.1390 | 1.9516 |
| VI Caucasian Republics | 0.8028 | 0.7735 | 0.6689 | 0.7262 | 0.7417 | 42.4425 | 0.6444 | 1.1123 |
| VII Baltic Republics | 1.0993 | 1.0354 | 2.1898 | 0.7502 | 0.9154 | 0.5773 | 33.5721 | 1.5330 |
| VIII Rural areas of the USSR | 9.6379 | 9.7253 | 9.9198 | 9.3061 | 9.9958 | 5.9301 | 9.9573 | 26.6747 |
| Total | 69.5456 | 70.8411 | 71.4219 | 67.7726 | 69.0668 | 70.4788 | 71.1977 | 69.1232 |
| *b Proportional allocations of life expectancy* | | | | | | | | |
| I RSFSR | 0.666049 | 0.287895 | 0.292086 | 0.286300 | 0.347000 | 0.205554 | 0.250158 | 0.369334 |
| II Ukrainian and Moldavian SSRs | 0.099379 | 0.492945 | 0.095564 | 0.072448 | 0.096408 | 0.060803 | 0.077601 | 0.123308 |
| III Byelorussian SSR | 0.015534 | 0.015504 | 0.394191 | 0.011322 | 0.015029 | 0.007812 | 0.018709 | 0.024331 |
| IV Central Asian Republics | 0.027126 | 0.020308 | 0.019550 | 0.436442 | 0.042764 | 0.018086 | 0.017094 | 0.030624 |
| V Kazakh SSR | 0.025979 | 0.020529 | 0.019693 | 0.034388 | 0.330079 | 0.013210 | 0.015998 | 0.028233 |
| VI Caucasian Republics | 0.011543 | 0.010919 | 0.009366 | 0.010715 | 0.010739 | 0.602203 | 0.009051 | 0.016092 |
| VII Baltic Republics | 0.015807 | 0.014616 | 0.030659 | 0.011070 | 0.013254 | 0.008191 | 0.471533 | 0.022177 |
| VIII Rural areas of the USSR | 0.138584 | 0.137283 | 0.138890 | 0.137314 | 0.144727 | 0.084140 | 0.139855 | 0.385901 |
| Total | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |

[a]Only urban areas are included in regions I–VII.

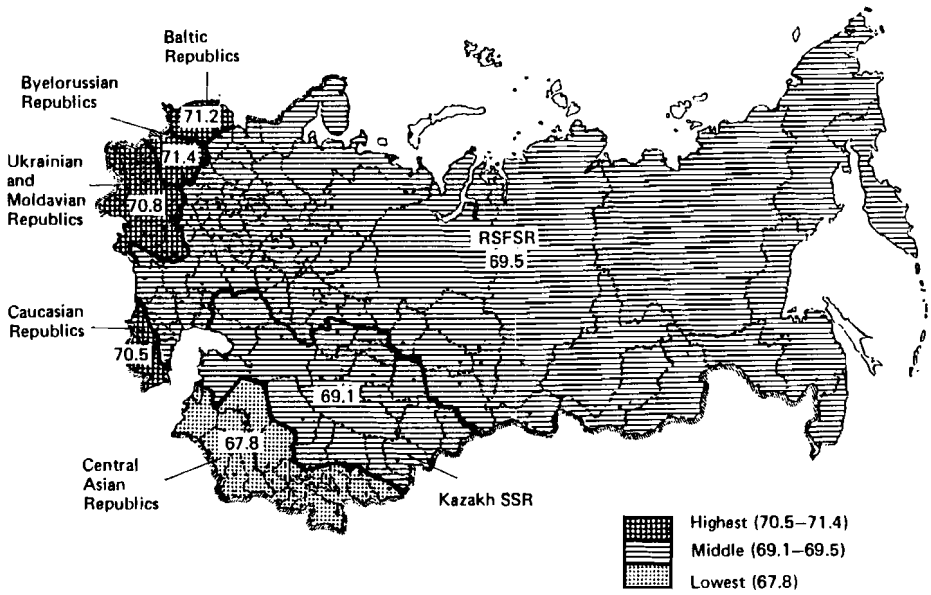


FIGURE 16 Regional life expectancies at birth in the seven urban regions of the USSR, 1974. The life expectancy in the rural regions is 69.1.

### *3.4 Fertility and Mobility Analysis*

Normally, fertility is studied by using data on only age-specific and gross fertility rates. The multiregional life table, however, allows for a more complete analysis of fertility patterns in different regions of the country by introducing the impact of internal migration. Spatial net reproduction rates and net reproduction allocations are the relevant multiregional indices.

Table 32a gives net reproduction rates (NRR) for all regions of the USSR. The bottom row of this table shows the total expected number of births per parent born in region $i$, given the multiregional regime of fertility, mortality, and migration. The elements in each column represent the distribution of this total among the different regions of birth of the child. The NRR matrix as a whole shows the regional distribution of the expected number of births by region of birth of parent and child. For example, of the expected 1.101 births per parent born in region I, 0.617 will occur in region I, 0.099 will occur in region II, 0.018 in region III, and so on.

As is apparent from Table 32a, the NRR for each region is greater than unity, indicating a rate of reproduction that is higher than bare replacement level for all regions. The highest NRRs are recorded in the republics of Central Asia and the Caucasus; the lowest in the RSFSR and the Baltic Republics. For the urban and rural populations of the USSR as a whole, the NRRs are 1.123 and 1.201, respectively.

TABLE 32 Spatial fertility expectancies for the eight regions of the USSR.

| Region of birth of child[a] | Region of birth of parent | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| *a Net reproduction rate* | | | | | | | | |
| I RSFSR | 0.617470 | 0.280237 | 0.283713 | 0.255046 | 0.343691 | 0.181463 | 0.240210 | 0.394466 |
| II Ukrainian and Moldavian SSRs | 0.098550 | 0.479390 | 0.096031 | 0.062055 | 0.093773 | 0.054764 | 0.075807 | 0.134883 |
| III Byelorussian SSR | 0.018405 | 0.018858 | 0.393518 | 0.011883 | 0.017495 | 0.008301 | 0.023997 | 0.033035 |
| IV Central Asian Republics | 0.054785 | 0.039568 | 0.037762 | 0.708136 | 0.093420 | 0.034386 | 0.032848 | 0.066051 |
| V Kazakh SSR | 0.035657 | 0.027399 | 0.025837 | 0.047888 | 0.325579 | 0.015705 | 0.020424 | 0.041811 |
| VI Caucasian Republics | 0.015286 | 0.014586 | 0.012154 | 0.013510 | 0.013752 | 0.849020 | 0.011863 | 0.024009 |
| VII Baltic Republics | 0.013687 | 0.012699 | 0.030168 | 0.008219 | 0.010657 | 0.006241 | 0.417444 | 0.021705 |
| VIII Rural areas of the USSR | 0.246736 | 0.253060 | 0.250828 | 0.234201 | 0.259923 | 0.132937 | 0.267132 | 0.485047 |
| Total | 1.100576 | 1.125797 | 1.130012 | 1.340938 | 1.158288 | 1.282818 | 1.089725 | 1.201007 |
| *b Net reproduction allocations* | | | | | | | | |
| I RSFSR | 0.561043 | 0.248923 | 0.251071 | 0.190200 | 0.296723 | 0.141457 | 0.220432 | 0.328446 |
| II Ukrainian and Moldavian SSRs | 0.089544 | 0.425823 | 0.084982 | 0.046277 | 0.080958 | 0.042691 | 0.069565 | 0.112308 |
| III Byelorussian SSR | 0.016723 | 0.016751 | 0.348243 | 0.088862 | 0.015104 | 0.006471 | 0.022021 | 0.027506 |
| IV Central Asian Republics | 0.049779 | 0.035146 | 0.033418 | 0.528090 | 0.080653 | 0.026805 | 0.030143 | 0.054996 |
| V Kazakh SSR | 0.032398 | 0.024338 | 0.022864 | 0.035712 | 0.281087 | 0.012243 | 0.018742 | 0.034813 |
| VI Caucasian Republics | 0.013889 | 0.012956 | 0.010756 | 0.010075 | 0.011872 | 0.661840 | 0.010886 | 0.019991 |
| VII Baltic Republics | 0.012436 | 0.011280 | 0.026697 | 0.006129 | 0.009200 | 0.004865 | 0.383073 | 0.018072 |
| VIII Rural areas of the USSR | 0.224189 | 0.224783 | 0.221969 | 0.174655 | 0.224403 | 0.103629 | 0.245137 | 0.403867 |
| Total | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |

[a]Only urban areas are included in regions I–VII.

The spatial net reproduction allocation is another way of looking at the net reproduction rate. It is simply the fraction of each column total in Table 32a that is allocated to each row. The allocations of the total regional net reproduction rates are given in Table 32b which shows, for example, that 32.8 percent of the births to parents born in region VIII, the rural areas of the USSR, will occur in region I.

Along with spatial net reproduction rates and allocations, one can also calculate spatial net migraproduction rates and allocations. These are given in Table 33.

The elements in Table 33a represent the number of out-migrations that a person born in region $i$ can expect to make from region $j$ during a lifetime. (In contrast to the GMR discussed in the section on observed population characteristics, the NMR includes the effects of mortality and interregional migration.) The elements of the main diagonal of this table characterize the pattern of interregional migration out of the region of birth. The highest interregional out-migration rate represents the flow from the urban areas of the RSFSR. Of the total 4.9 migrations per person born in the RSFSR, 3.4 will originate in this region of birth. The lowest rate represents migration from the urban areas of the Caucasus (region VI).

By comparing the total spatial net migraproduction rates (Table 33a) with the total gross migraproduction rates (Table 24) for each region, one can estimate the migration changes taking place owing to regional differences in mortality and internal migration (Table 34).

### *3.5 Multiregional Population Projection to Stability*

The consistent projection of regional population growth is one of the most important contributions of multiregional demographic analysis. In this section, the projection of the 1974 populations of all eight regions is described and extended to the urban–rural dimensions. Appendix C gives the age structure of the populations projected until the year 2024. All age-specific fertility, mortality, and migration rates for this projection were held constant at their 1974 levels. A program elaborated at IIASA and described by Willekens and Rogers (1978) was used.

Table 35 presents the aggregate totals of the population projection and the percentage of the total population in the individual regions of the country for the 1984–2024 period. According to this table, the assumption of constant rates of fertility, mortality, and migration implies that the population will increase in all regions except region VIII during the projection period. Contributing to a total increase of 88 246 thousand in the USSR population, is a growth in the urban population of 100 830 thousand, and a decrease in the rural population of 12 583 thousand.

The largest percentage increase in the population is expected in region IV. During the 1984–2024 period, the Central Asian population is expected to

TABLE 33 Net migraproduction rates for the eight regions of the USSR.

| Region of out-migration[a] | Region of birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| *a Net migraproduction rate* | | | | | | | | |
| I RSFSR | 3.354594 | 1.283122 | 1.308196 | 1.174245 | 1.563450 | 0.850954 | 1.098917 | 1.744400 |
| II Ukrainian and Moldavian SSRs | 0.403216 | 2.561328 | 0.393515 | 0.254488 | 0.381515 | 0.226558 | 0.307133 | 0.535683 |
| III Byelorussian SSR | 0.075868 | 0.077267 | 2.421802 | 0.048652 | 0.071567 | 0.034635 | 0.098057 | 0.133086 |
| IV Central Asian Republics | 0.107333 | 0.077484 | 0.074332 | 1.762041 | 0.182309 | 0.067772 | 0.064212 | 0.126707 |
| V Kazakh SSR | 0.154293 | 0.118875 | 0.113179 | 0.202958 | 1.977853 | 0.070593 | 0.088885 | 0.174548 |
| VI Caucasian Republics | 0.025532 | 0.024373 | 0.020473 | 0.022586 | 0.023028 | 1.602826 | 0.019859 | 0.038819 |
| VII Baltic Republics | 0.056898 | 0.052475 | 0.126473 | 0.034243 | 0.043995 | 0.026484 | 2.409023 | 0.087350 |
| VIII Rural areas of the USSR | 0.676557 | 0.692498 | 0.690636 | 0.627359 | 0.710596 | 0.353794 | 0.736318 | 1.869905 |
| Total | 4.854291 | 4.887421 | 5.148608 | 4.126572 | 4.954313 | 3.233618 | 4.822403 | 4.710498 |
| *b Net migraproduction allocations* | | | | | | | | |
| I RSFSR | 0.691058 | 0.262536 | 0.254087 | 0.284557 | 0.315573 | 0.263159 | 0.227877 | 0.370322 |
| II Ukrainian and Moldavian SSRs | 0.083064 | 0.524065 | 0.076431 | 0.061670 | 0.077007 | 0.070063 | 0.063689 | 0.113721 |
| III Byelorussian SSR | 0.015629 | 0.015809 | 0.470380 | 0.011790 | 0.014445 | 0.010711 | 0.020334 | 0.028253 |
| IV Central Asian Republics | 0.022111 | 0.015854 | 0.014437 | 0.426999 | 0.036798 | 0.020959 | 0.013315 | 0.026899 |
| V Kazakh SSR | 0.031785 | 0.024323 | 0.021982 | 0.049183 | 0.399219 | 0.021831 | 0.018432 | 0.037055 |
| VI Caucasian Republics | 0.005260 | 0.004987 | 0.003976 | 0.005473 | 0.004648 | 0.495676 | 0.004118 | 0.008241 |
| VII Baltic Republics | 0.011721 | 0.010737 | 0.024565 | 0.008298 | 0.008880 | 0.008190 | 0.499548 | 0.018544 |
| VIII Rural areas of the USSR | 0.139373 | 0.141690 | 0.134140 | 0.152029 | 0.143430 | 0.109411 | 0.152687 | 0.396965 |
| Total | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |

[a]Only urban areas are included in regions I–VII.

TABLE 34 The regional GMR and NMR for the eight regions of the USSR.

| Indices | Regions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| Multiregional calculations | | | | | | | | |
| GMR | 5.544 | 5.183 | 5.957 | 4.569 | 6.792 | 2.837 | 5.035 | 5.696 |
| NMR | 4.854 | 4.887 | 5.148 | 4.127 | 4.954 | 3.234 | 4.822 | 4.710 |
| Single-region calculations | | | | | | | | |
| NMR | 4.854 | 4.669 | 5.354 | 3.847 | 5.719 | 2.516 | 4.481 | 5.061 |

increase almost twofold. The populations in region III and region VII should grow considerably, increasing by 64.8 percent and 64.6 percent, respectively. The rural population is expected to decrease by 14.1 percent.

The regional shares will also change considerably. The share of the national population residing in region I will increase substantially. In 1974 it was 35.2 percent; by 1984 it will approach 39.5 percent; and by 2024 it will converge to 44.7 percent. The share of the population living in region II will grow by 2.0 percent for 1984–2024 and that living in region IV by 1.8 percent. The rural population will decrease to about 21.0 percent of the total.

The mean age of the population will increase along with the growth in size of the older age groups, confirming that the population is aging. Thus, even though the birth rates are assumed to remain constant, the proportion of the population in the older age groups will change.

By the end of the projection period (1974–2024), along with the increase in the mean age of the country's population by 1.94 years (Appendix C), the mean age in region I will increase by 2.80 years, in region II by 1.91 years, in region V by 3.41 years, and so on. The mean age of the rural population (region VIII) declines from 34.9 years to 32.9 years. The populations of the Central Asian and the Caucasian Republics will continue to be the "youngest" in the country. The mean age of the urban population of these regions is projected to lie in the range 28.6–32.5 years. The "oldest" age structure will be found in the urban areas of the Baltic Republics and the RSFSR, with mean ages of 37.0 and 36.6, respectively.

Appendix C also gives the *stable equivalent* of the 1974 observed population. This hypothetical population (Rogers 1975) represents the total number of people that, with the same age distribution as the stable population, would increase at the same rate and tend toward the same ultimate population as would, in the long run, the observed population under projection. The comparison of the indices of the stable equivalent population and the observed population makes it possible to estimate the effect on a population of changes in age structure.

TABLE 35 Multiregional population projection for the USSR with 1974 fertility, mortality, and migration rates.

| Region[a] | 1984 | 1994 | 2004 | 2014 | 2024 |
|---|---|---|---|---|---|
| *Population (in thousands)* | | | | | |
| I RSFSR | 109 168.5 | 126 828.8 | 139 760.8 | 152 497.7 | 162 998.4 |
| II Ukrainian and Moldavian SSRs | 36 683.3 | 42 799.1 | 47 413.8 | 51 989.1 | 55 795.0 |
| III Byelorussian SSR | 6 244.8 | 7 656.7 | 8 652.4 | 9 570.2 | 10 294.1 |
| IV Central Asian Republics | 11 694.6 | 14 683.8 | 17 218.7 | 19 776.4 | 22 141.8 |
| V Kazakh SSR | 9 226.4 | 10 829.3 | 11 968.5 | 13 059.9 | 13 974.4 |
| VI Caucasian Republics | 8 309.5 | 9 700.1 | 10 872.2 | 12 125.7 | 13 285.4 |
| VII Baltic Republics | 5 680.6 | 6 849.6 | 7 765.5 | 8 633.1 | 9 349.5 |
| VIII Rural areas of the USSR | 89 263.7 | 80 281.6 | 75 937.5 | 75 480.3 | 76 678.4 |
| Total | 276 271.7 | 299 629.2 | 319 589.5 | 343 132.6 | 364 517.0 |
| *Population shares (in percent)* | | | | | |
| I RSFSR | 39.51 | 42.33 | 43.73 | 44.44 | 44.72 |
| II Ukrainian and Moldavian SSRs | 13.28 | 14.28 | 14.84 | 15.15 | 15.31 |
| III Byelorussian SSR | 2.26 | 2.56 | 2.71 | 2.79 | 2.82 |
| IV Central Asian Republics | 4.23 | 4.90 | 5.39 | 5.76 | 6.08 |
| V Kazakh SSR | 3.34 | 3.61 | 3.74 | 3.81 | 3.83 |
| VI Caucasian Republics | 3.01 | 3.24 | 3.40 | 3.53 | 3.64 |
| VII Baltic Republics | 2.06 | 2.29 | 2.43 | 2.52 | 2.56 |
| VIII Rural areas of the USSR | 32.31 | 26.79 | 23.76 | 22.00 | 21.04 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

[a]Only urban areas are included in regions I–VII.
SOURCE: Appendix C.

Figures 17–19 show the age structures of the observed and the stable equivalent populations in three regions of the country. As is apparent from these figures, the urban population of the Central Asian Republics and the country's rural population have an age structure that is considerably different from the age structure of the corresponding stable population. The high migration level in particular age groups causes substantial differences between the original population and the corresponding stable population. The population of the Baltic urban areas, on the other hand (Figure 19), has an age composition that is similar to the age structure of the stable population.

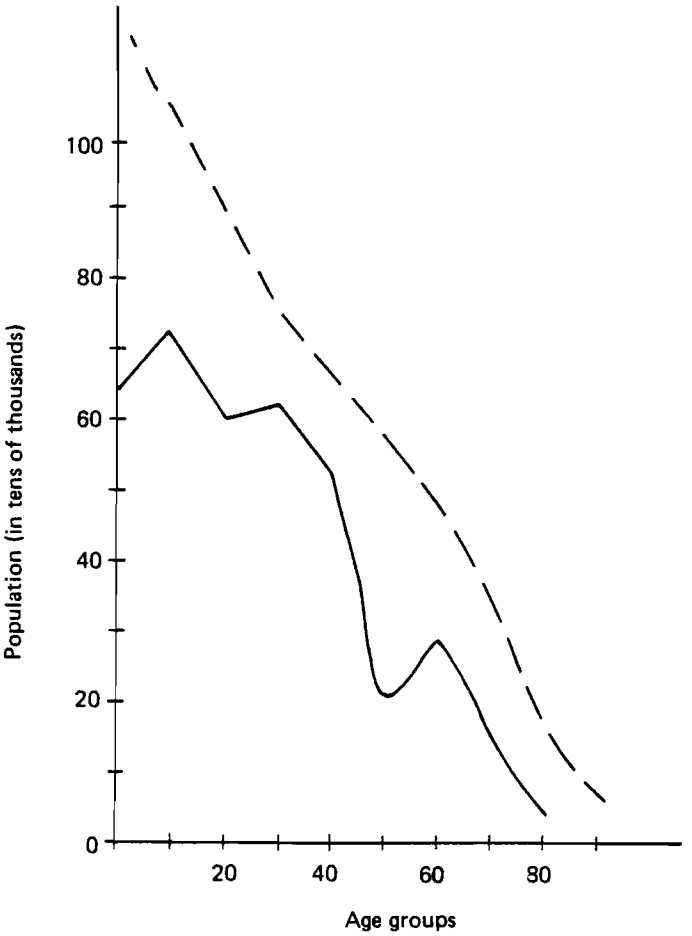


FIGURE 17 Age composition of observed (—) and stable equivalent (- - -) populations in the urban areas of the Central Asian Republics.

One can see that for the urban areas of the Central Asian Republics the curve representing the stable equivalent population (Figure 17) lies above the curve showing the distribution of the original population; this is characteristic of a growing population. In the rural areas of the country, however, where a population decrease is observed in the projection, the curve showing the distribution of the stable equivalent population lies below that of the observed population.

It is interesting to compare the mean age of the original population (1974) and the mean age projected for the year 2024 with the mean age of the stable equivalent population. As is apparent from Table 36, the mean age of the stable population differs considerably from the mean age of the original

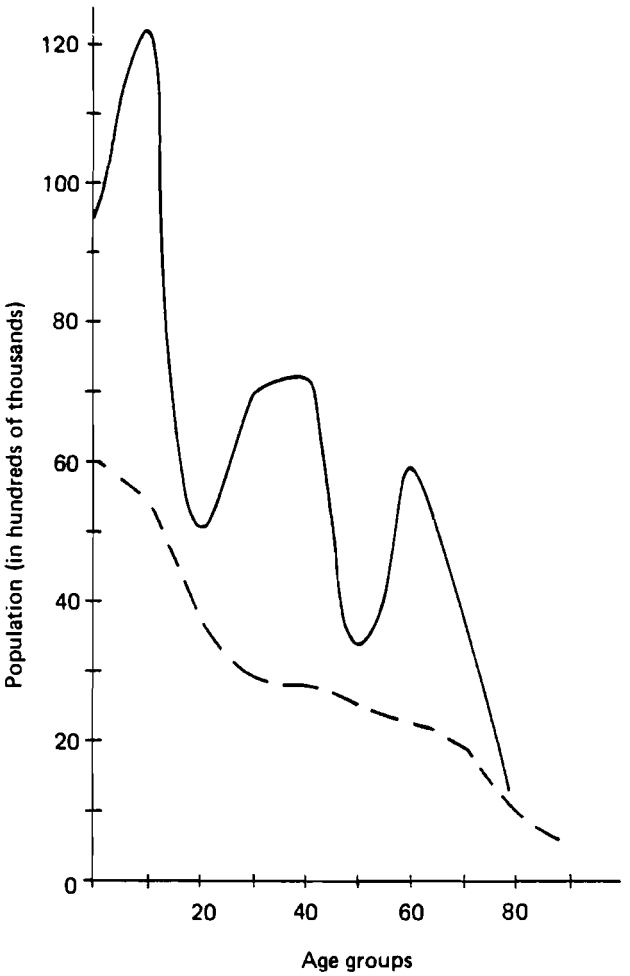


FIGURE 18 Age composition of observed (—) and stable equivalent (- - -) populations in the rural areas of the USSR.

population but is quite close to the projected 2024 value for the USSR as a whole and for the majority of the individual regions.

The stable 5-year growth ratio $\lambda$ exceeds unity in all regions at the end of the projection period (Table 36). In the early years, the growth ratio in region VIII is below unity, but by the year 2024 it is projected to be 1.0081. The highest population growth ratios between 2019 and 2024 occur in regions IV and VI, and the lowest in region VIII. The difference between the highest and lowest regional population growth ratios for this period is 0.0455. The growth ratio for the entire population of the USSR is 1.0281, while the growth ratio for the stable population is 1.0297. This ratio can be used to calculate the

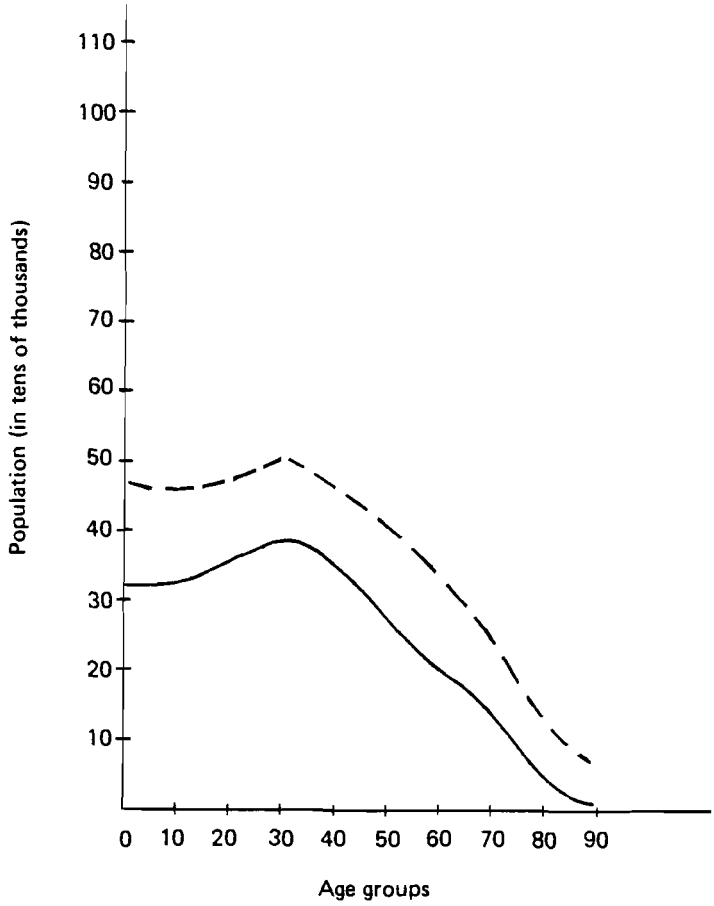


FIGURE 19 Age composition of observed (–) and stable equivalent (– – –) populations in the urban areas of the Baltic Republics.

intrinsic growth rate $r = (1/5)\ln \lambda$, shown in Table 36 to be 0.0058 for the stable equivalent population.

The aggregation of the input data on rates of birth, death, and migration for the urban areas in the seven regions (Figure 14) into a single region makes it possible to project the entire urban and rural populations of the country. In Appendix C the results of such a calculation for 1984–2024 are given.*

We now consider the age structure of the urban and rural populations according to the enlarged age groups given in Table 37. As is apparent from this

*Minor differences between these calculations and the above-mentioned calculations of the population projection for the eight-region system result from the different aggregations of the input data.

TABLE 36 Characteristics of the 1974 and 2024 populations and the stable equivalent population of the USSR.

| Characteristic | Regions | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII | |
| *Population (in thousands)* | | | | | | | | | |
| 1974 | 88 230 | 29 527 | 4 549 | 8 682 | 7 348 | 6 918 | 4 334 | 101 280 | 250 869 |
| 2024 | 162 998 | 55 795 | 10 294 | 22 142 | 13 974 | 13 285 | 9 349 | 76 678 | 364 517 |
| Stable equivalent population | 118 753 | 40 667 | 7 435 | 19 406 | 10 373 | 11 704 | 6 866 | 54 526 | 269 729 |
| *Mean ages* | | | | | | | | | |
| 1974 | 33.84 | 33.96 | 30.67 | 27.71 | 29.48 | 29.89 | 34.00 | 32.83 | 32.94 |
| 2024 | 36.65 | 35.87 | 33.49 | 28.64 | 32.89 | 32.50 | 37.00 | 32.92 | 34.88 |
| Stable equivalent population | 37.04 | 36.35 | 34.07 | 29.01 | 33.21 | 32.96 | 37.68 | 32.74 | 35.09 |
| *Growth ratio* $\lambda$ | | | | | | | | | |
| 1974–1979 | 1.1183 | 1.1209 | 1.1865 | 1.1676 | 1.1277 | 1.0963 | 1.1565 | 0.9401 | 1.0499 |
| 2019–2024 | 1.0305 | 1.0326 | 1.0334 | 1.0536 | 1.0310 | 1.0430 | 1.0367 | 1.0081 | 1.0281 |
| Stable equivalent population | 1.0297 | | | | | | | | |
| $r = (1/5)\ln \lambda$ | | | | | | | | | |
| 1974–1979 | 0.0224 | 0.0228 | 0.0342 | 0.0310 | 0.0240 | 0.0184 | 0.0291 | −0.0123 | 0.0097 |
| 2019–2024 | 0.0060 | 0.0064 | 0.0065 | 0.0104 | 0.0061 | 0.0084 | 0.0072 | 0.0016 | 0.0055 |
| Stable equivalent population | 0.0058 | | | | | | | | |

TABLE 37 The projected urban and rural populations of the USSR, 1984–2024.

| Age groups | 1984 | | 1994 | | 2004 | | 2014 | | 2024 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban | Rural |
| *Population (in thousands)* | | | | | | | | | | |
| 0–4 | 17 240.8 | 8 698.4 | 18 412.3 | 8 049.0 | 19 355.8 | 7 827.9 | 21 576.4 | 8 163.3 | 22 157.6 | 8 270.7 |
| 5–14 | 25 218.7 | 17 216.2 | 35 205.2 | 16 454.8 | 36 021.4 | 15 116.9 | 39 241.7 | 15 332.5 | 42 496.9 | 15 870.6 |
| 15–59 | 120 146.9 | 45 845.5 | 134 040.0 | 38 085.0 | 149 053.4 | 35 657.7 | 164 240.3 | 37 312.9 | 170 701.1 | 38 263.7 |
| 60+ | 24 322.9 | 17 468.7 | 31 409.4 | 17 595.1 | 38 576.3 | 17 167.2 | 41 297.9 | 14 399.8 | 50 265.7 | 13 855.8 |
| Total | 186 929.3 | 89 228.8 | 219 066.9 | 80 183.9 | 243 006.6 | 75 769.7 | 266 356.3 | 75 208.5 | 285 620.3 | 76 260.4 |
| *Population shares (percentage distribution)* | | | | | | | | | | |
| 0–4 | 9.22 | 9.74 | 8.40 | 10.04 | 7.96 | 10.33 | 8.10 | 10.85 | 7.76 | 10.85 |
| 5–14 | 13.49 | 19.29 | 16.07 | 20.52 | 14.82 | 19.95 | 14.73 | 20.39 | 14.88 | 20.81 |
| 15–59 | 64.28 | 51.39 | 61.19 | 47.50 | 61.35 | 47.06 | 61.67 | 49.61 | 59.76 | 50.18 |
| 60+ | 13.01 | 19.58 | 14.34 | 21.94 | 15.87 | 22.66 | 15.50 | 19.15 | 17.60 | 18.17 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

table, in the urban areas of the country the number of children aged 0–4 years increases during the entire projection period. By 1984 the population of this age group will be 17 million; by 2004 it will increase to 19 million; and by the year 2024 it will grow to 22 million. The number of children aged 5–14 years will also increase in this region – from 25 to 42 million over the 40-year period (1984–2024).

## 4 POPULATION POLICY*

The problem of population policy is closely connected with population growth processes and is conditioned by the economic development of a society. A comparison of the economic limits of population change with indices of demographic and economic development makes it possible to estimate a population growth rate that leads to a more optimal balance between the growth of the population and the growth of the economy. A recent study by Pankrat'eva (1977) found that population growth in the USSR in 1960–1975 was below the level required to balance the growth in the economy. The reduction in population growth rates has led to an increased awareness of problems of population policy during the past 15 years, in particular the quantitative dependence of demographic indices on a number of complex factors. The estimation of the total expenditure necessary to support a population policy that is rational from the standpoint of the optimal process of economic development for the country as a whole has been an important focus.

### *4.1 Fertility and Health Care*

The population policy of the USSR is an integral part of the state's socioeconomic policy, and it is associated with the general problem of providing the country's economy with the appropriate quantity and quality of manpower. The goals of this policy are: improvement of the current demographic situation in the country; anticipation of expected difficulties in the utilization of labor forces; and the attainment of an equilibrium between population increase and the production of material wealth.

Population policy is affected by economic, administrative, judicial, and ideological measures.** The economic measures include: child allowance, tax differentiation related to family size, dwelling space privileges, development of institutions and services for children, stimulation of migration for material benefits and for the benefits of society, bachelor taxes, improvement of conditions of work and labor protection, development of public health care, and so on. The administrative and judicial measures include: legislative acts determining the minimum age of marriage, the prohibition of abortion, the use of

*This section was written with the aid of the following works: Pankrat'eva (1977), Rybakovskii (1974), and Khorev and Chapek (1978).
**See Valentei (1974).

contraception, and so on. The ideological measures involve the utilization of all possible means of mass information for the purpose of influencing the birth rate in the direction desired by society.

In the USSR, population policy is implemented in many ways, including paid maternity leave; grants for the use of nurseries, kindergartens, sanatoria, boarding schools, and hospitals; free education in secondary schools, secondary professional educational institutions, and higher educational institutions; and support payments to parents for their children, payment for leave connected with the care of sick children, and the development of public health care services.

The educational, maintenance, and service cost allowances that come from the State budget are increasing yearly in the USSR. These expenditures include payment for the upbringing of children and their general education; State grants to mothers with many children, to single mothers, and to expectant mothers; birth grants; free services in children's institutions and pioneer camps; and out-of-school grants. The total amount spent in this field increased by 5.6 milliard rubles, or 1.7 times, between 1965 and 1975.* This increase includes: kindergartens, expenditure more than doubled; general educational schools of all kinds, expenditure 1.5 times greater; higher educational institutions, expenditure doubled; technical schools and schools for the training of medium-level specialists, expenditure more than doubled. Expenditure on vocational education was 2.5 times greater in 1974 than in 1965. Grants for pregnancy, maternity care, and child nursing more than doubled during this period of time; grants for children's institutions, pioneer camps, and out-of-school service costs were 1.9 times greater. These expenditures comprise 27.8 percent of the entire State budget intended for sociocultural affairs and science.**

In the USSR much attention is given to prevention of disease among women and children through a wide network of maternity hospitals, maternity and child consultation clinics, dispensaries, hospitals, and a network of permanent out-of-school institutions. The number of beds (medical and obstetrical) for expectant mothers and women in childbirth increased 1.5 times between 1940 and 1975. Over this period of time the number of maternity consultation clinics, child polyclinics, and dispensaries grew 2.6 times; the number of children attending out-of-school institutions increased 5.9 times; and the number of children in kindergartens and day nurseries, 10.5 times.

A considerable part of the program for social development in the USSR, adopted by the XXV Party Congress, is devoted to new population policy measures. These measures relate to further improvement in the conditions of work, labor protection, the working and living conditions of working women, social maintenance, and population health protection.

Over the 1976–1980 period the improvement of the working women's conditions will be achieved by granting paid leave for the first year of a child's

*Without capital investment.
**Central Statistical Office (1976), pp. 745, 746.

life; providing women who have children with more ample opportunities for shorter working hours and with the possibility of working at home, expanding the network of out-of-school institutions and schools; and increasing the number of camps, sport camps, and labor centers for children and young people.

Further development of public health care and cultural facilities to promote increases in life expectancy and improve the general level of health plays a significant role in the population policy of the country. As we have seen, a decrease in the death rate increases the population growth rate significantly and, therefore, increases the potential labor force and the growth of population-related economic activity.

### *4.2 Migration*

Migration within a country can have positive or negative effects on its overall economic development. For example, there can be an undesirable redistribution of population from regions of labor shortage to regions of labor surplus, an excessive outward flow of rural population to cities, or an inadequate proportion of migrants moving to regions of new development. Thus, the need for a population policy is apparent.

The planned redistribution of labor is a particularly important component of population policy, and various regions have addressed the problem differently. The alternative approaches to this problem appear to have been the results of social, economic, practical, and technical decisions made on the basis of a particular region's history of development.

The problem of maintaining a stable labor force in the less-developed regions of the country occupies a particular place in the decision making that is focused on this problem. The stimulation of the material welfare of the population of the country's less-developed regions is principally carried out by means of allocation of privileges, of which there are two kinds. First, there are privileges which release migrants from many expenditures (for example, the abolishment of debts, the repeal of obligatory deliveries and agricultural taxes, the reduction of rents on apartments reserved and temporarily left in the region of out-migration, exemption from service in the armed forces or a shortening of the call-up period, and free or low-cost transportation for persons and goods). Second, there are privileges in the form of supplementary incomes and advantages obtained by migrants (for example, wage and salary supplements, additional leave without loss of pay, grants, large traveling expenses, and loans). This system of privileges aims to attract people to live permanently in less-developed regions of the nation.

The policy of privileges for migration and population stabilization is carried out in concert with general economic development in the less-developed regions. In addition to incentives, moral persuasion plays an important role. The enthusiasm and patriotism of the Soviet people shown in the development of new lands is well known: for example, the Komsomol calls in the 1930s,

the development of the northern regions during the war (when all privileges were canceled), and the social calls by youth for working in the new regions today.

The migration flow from the rural to the urban areas poses an important problem concerning labor force redistribution in the country. This problem affects both the economic interests of agriculture, industry, and construction and the broader interests of the population. It is impossible to study the problem of rural–urban migration, particularly of the young, without also taking into consideration the existing cultural setting of the Soviet Union. Sociological research carried out in some regions of the country shows that today it is not only the level of wages that is important to young people in rural areas, but also factors such as the availability and type of employment, and the amount of leisure time. The growing contradictions between these demands and the facilities that the thousands of small villages are able to offer is the main force behind the migrations of the young to urban areas. According to the data, out-migration is most intensive from rural settlements with less favorable cultural and welfare conditions. In some cases, this migration is so intense that the settlement disappears altogether.

The policy problem, then, is to reorganize the existing system of rural settlements, eliminate the small villages, and encourage migration to regions that will foster acceptable working and living conditions. This rural settlement reconstruction requires long-term planning in which the industrial, housing, cultural, and welfare conditions would be sufficient to accommodate almost the entire rural population, considerably decreasing the number of existing villages.

At the same time, much attention is being given to the problem of educating the village youth for the more sophisticated agricultural production requirements (in particular, to produce young, skilled machine operators and personnel with a higher level of education for the agricultural economy). It is also important to provide the conditions necessary for the residential stability of skilled workers in their villages.

Migration in the USSR, however, is not restricted to rural–urban flows. Migration is also dependent to a large extent on general interurban population mobility. The share of urban in-migration attributable to migration from other *urban* areas was 60–65 percent in the 1960s.

The nation's urban migration policy is aimed at restricting the growth of large cities, the more active development of cities of a medium size, the construction of new regional centers, and the more uniform distribution of these centers throughout the country. All these measures should equalize urbanization levels and improve the migration situation, thereby approaching more closely the desired levels of socioeconomic development in urban and rural areas throughout the USSR.

## 5 CONCLUSION

This report describes briefly the methods and possible uses of a multiregional population analysis carried out for the eight regions of the USSR. As is apparent, traditional data used in a multiregional population analysis make it possible to describe multiregional relations within the observed system and to estimate the influence of migration flows on the population distribution and structure.

The multiregional analysis may be divided into two parts. In the first part, the *measurement* of population characteristics using multiregional methods is emphasized. The measures are based on age-specific fertility, mortality, and out-migration rates, and other demographic data. This part of the work also includes an analysis of multiregional life tables, including an estimation of the life histories of cohorts born in each region, an estimation of the life expectancy by age and region, a detailed analysis of the character of population mobility in individual regions, and a quantitative estimation of the multiregional population relations. The results of the study would have been more interesting if, instead of the eight regions selected, a more detailed territorial division had been observed. For example, it would be interesting to carry out a similar study for individual areas within such large regions as the RSFSR and the Kazakh SSR. In this case it would be important to analyze the population development in urban and rural areas of each region separately, bearing in mind the existing differences in the urban and rural population reproduction rates. Unfortunately, because of the vast amount of data needed for such an analysis, it would be very difficult to carry out a study of this nature for a country as large as the USSR.

The second part of this work focused on population *projection* and an analysis of several demographic indices of projection by age and region, including a comparison of the observed population with the stable equivalent population. Population projection in this case produces the population that would evolve from the original population during a given period of time, if the age-specific rates of birth, death, and migration remained fixed for the entire projection period.

However, it is necessary to point out that the potentialities of the program for calculating the future population are much greater than those referred to above. The program used to carry out the population projection also allows one to generate a future population on the basis of various hypotheses concerning fertility, mortality, and migration. These hypotheses may relate to the age-specific rates of the regional populations within the multiregional system. Thus, multiregional population analysis is useful not only for projection but also for developing some of the probable consequences of alternative demographic policies.

REFERENCES

Borisov, V.A. (1976) Perspectivy rozhdajemosti (Birth Rate Prospects). Moscow: Statistika.

Central Statistical Office (1973) Itogi vsesojnznoj perepisi naselenija 1970 goda. Tt. 1,2. Chislennost' naselenija SSSR, sojuznykh i avtonomnykh respublik, krajev i oblasteiji (Results of the Soviet Union's Population Census of 1970. Vols. 1, 2. The Size of the Population of the USSR, Union and Autonomous Republics, Territories and Regions). Moscow: Statistika.

Central Statistical Office (1974) Itogi vsesojuznoj perepisi naselenija 1970 goda. T. 7 (Results of the Soviet Union's 1970 Population Census. Vol. 7). Moscow: Statistika.

Central Statistical Office (1975) Naselenije SSSR (chislennost', sostav i dvizhenije naselenija). 1973. Statisticheskij sbornik [The Population of the USSR (Population Size, Structure and Migration) 1973. Statistical Yearbook]. Moscow: Statistika.

Central Statistical Office (1976) Narodnoje khoziajstvo SSSR v 1975 (National Economy of the USSR in 1975). Moscow: Statistika.

Kalinjuk, I.V. (1975) Vozrastnaja struktura naselenija SSSR (Age Structure of the Population of the USSR). Moscow: Statistika.

Khorev, B.J., and V.M. Moiseyenko (1976) Sdvigi v razmeschenii naselenija SSSR (Changes in the Distribution of the USSR Population). Moscow: Statistika.

Khorev, B.J., and V.N. Chapek (1978) Problemy izuchenija migracii naselenija (Problems of Analyzing Population Migration). Moscow: Myslj.

Kurman, M.V. (1976a) Aktualjnyje voprosy demografii (Urgent Problems of Demography). Moscow: Statistika.

Kurman, M.V. (1976b) Demograficheskije processy v SSSR v poslevojennyi period (Demographic Processes in the USSR over the Postwar Period). Moscow: Statistika.

Ledent, J. (1978) Some Methodological and Empirical Considerations in the Construction of Increment–Decrement Life Tables. RM-78-25. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Pankrat'eva, N. (1977) Naselenije i socialisticheskoje vosproizvodstvo (Population Reproduction under Socialism). Moscow: Statistika.

Rogers, A. (1968) Matrix Analysis of Interregional Population Growth and Distribution. Berkeley and Los Angeles: University of California Press.

Rogers, A. (1975) Introduction to Multiregional Mathematical Demography. New York: Wiley.

Rybakovskii, L.Z. (1974) Regionalnyi analis migracii (Regional Analysis of Migration). Moscow: Statistika.

Urlanis, B.C. (1977) The dynamics of the level of birth rates in the USSR for the years of the Soviet power. Bracknost', rozhdajemost', smertnost' v Rossii i v SSSR (Matrimony, Birth, and Mortality Rates in Russia and the USSR). Moscow: Statistika (in Russian).

Valentei, D. (1974) Politika narodonaselenija i ejo sostavljajusehije. Demografickeskaja politika (Population Development Policy and its Components. Demographic Policy). Moscow: Statistika.

Vishnevskii, A.G., ed. (1977) Brachnostj, rozhdajemostj, smertnostj v Rosii i v SSSR (Matrimony, Birth, and Mortality Rates in Russia and the USSR). Moscow: Statistika.

Willekens, F. (1977) The Recovery of Detailed Migration Patterns from Aggregate Data: An Entropy Maximizing Approach. RM-77-58. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Willekens, F. (1978) The Comparative Migration and Settlement Study: Background Paper for the 1978 September Conference. WP-78-10. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Willekens, F., and A. Rogers (1976) Computer Programs for Spatial Demographic Analysis. RM-76-58. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Willekens, F., and A. Rogers (1977) More Computer Programs for Spatial Demographic Analysis. RM-77-30. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Willekens, F., and A. Rogers (1978) Spatial Population Analysis: Methods and Computer Programs. RR-78-18. Laxenburg, Austria: International Institute for Applied Systems Analysis.

FURTHER READING

Academy Nauk USSR (1978) Socialnyje factory i osobennosti migracii naselenija SSSR (Social Factors and the Migration of the USSR Population). Moscow: Nauka.

Basalajeva, N.A. (1978) Modelirovanije demograficheskih processov i trudovykh resursov (Modeling of Demographic Processes and Labor Forces). Moscow: Nauka.

Bednyi, M.C. (1972) Demograficheskije processy i prognozy zdorovja naselenija (Demographic Processes and Population Health Forecasting). Moscow: Statistika.

Bojarskii, A., ed. (1974) Naselenije SSSR. Spravochnik (Population of the USSR. Reference Book). Moscow: Politizdat.

Boldyrev, B.A. (1974) Itogi perepisi naselenija SSSR (Results of the USSR's Population Census). Moscow: Statistika.

Bondarevskaja, G.A. (1970) The role of the ethnic factor in the territorial differences of birth rates. Voprosy demografii (Problems of Demography). Moscow: Statistika (in Russian).

Bondarevskaja, G.A. (1977) Rozhdajemostj v SSSR (Birth Rates in the USSR). Moscow: Statistika.

Brejev, B.D. (1977) Podvizhnostj naselenija i trudovykh resursov (Mobility of the Population and Labor Force). Moscow: Statistika.

Central Statistical Office (1976) Rozhdajemostj (problemy izuchenija). Sbornik statej [The Birth Rate (Problems of Analysis). Collected Articles] . Moscow: Statistika.

Fedorenko, N., ed. (1976) Vosproizvodstvo naselenija u trudovykh resursov (Reproductive Capabilities of the Population and Labor Force). Moscow: Nauka.

Kvasha, A. (1974) Problemy ekonomiko–demograficheskogo razvitija SSSR (Problems of Economic–Demographic Development in the USSR). Moscow: Statistika.

Kvasha, A., ed. (1977) Upravlenije razvitijem narodonaselenija v SSSR (problemy i perspektivy) (1977) [Control of Population Development in the USSR (Problems and Prospects)] . Moscow: Statistika.

Kvasha, A. (1978) The demographic situation and population policy in the USSR. Ekonomicheskie Nauki 2 (in Russian).

Maksimov, G., ed. (1976) Vsesojuznaja perepisi naselenija 1970. Sbornik statej (Census of the Population of the Soviet Union. Collected Articles). Moscow: Statistika.

Pivovarov, Z. (1976) Sovremennaja urbanizacija. Osnovnyje tendencii rasselenija (The Present Urbanization. Main Trends of Settlement). Moscow: Statistika.

Pokshishevskii, P., ed. (1976) Problemy migracii naselenija v SSSR. Sbornik statej (Problems Associated with Migration of the USSR Population. Collected Articles). Moscow: Geograficheskoe Obsnenestvo SSR.

Rogers, A. (1975) Spatial Migration Expectancies. RM-75-57. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Rogers, A., and L. Castro (1976) Model Multiregional Life Tables and Stable Populations. RR-76-09. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Ryabushkin, T., ed. (1977) Naselenije sojuznykh respublik. Sbornik statej (Population of the Union Republics. Collected Articles). Moscow: Statistika.

Rybakovskii, L.Z., ed. (1976a) Territorial'nye osobennosti narodonaselenija RSFSR (Territorial Peculiarities of the RSFSR Population). Moscow: Statistika.

Rybakovskii, L.Z., ed. (1976b) Socialnyje problemy migracii. Sbornik statej (Social Problems of Migration. Collected Articles). Moscow: Institut Sotsiologicheskikh Issledovanii.

Slesarev, G.A. (1978) Demograficheskije processy i socialnaja struktura socialisticheskogo obschestva (Demographic Processes and the Social Structure of Socialist Societies). Moscow: Nauka.

Tkachenko, A.A. (1978) Ekonomicheskije posledstvija sovremennykh demograficheskih processov v SSSR (Economic Consequences of the Present Demographic Processes in the USSR). Moscow: Statistika.

Tomin, V. (1977) Regional characteristics of reproduction and population migration. Sociologicheskie Issledovanija 2 (in Russian).

Urlanis, B.C. (1974) Problemy dinamiki naselenija SSSR (Problems of the Dynamics of the USSR Population). Moscow: Nauka.

Urlanis, B.C. (1976) Narodonaselenie: issledovanija, publitsistika (Population: Studies and Essays). Moscow: Statistika.

Urlanis, B.C. (1978) Evolucija prodolzhitelnosti zhizni (Evolution of Life Expectancy). Msocow: Statistika.

Valentei, D., A. Kvasha, and V. Sysenko (1976) Socioeconomic problems of demographic policy. Planovoe Khoziajstvo 11 (in Russian).

Vasiljeva, E.K. (1978) Socialno–ekonomicheskaja struktura naselenija SSSR (Socioeconomic Structure of the USSR Population). Moscow: Statistika.

Vishnevskii, A.G. (1976) Demograficheskaja revolucija (The Demographic Revolution). Moscow: Statistika.

# APPENDIXES

*Appendix A*

## AGE-SPECIFIC MORTALITY, FERTILITY, AND MIGRATION RATES, TOTAL POPULATION, 1974

LEGEND

| | |
|---|---|
| rsfsr: | urban areas of the Russian Federal Republic (region I) |
| ukrmol: | urban areas of the Ukrainian and Moldavian SSRs (region II) |
| belssr: | urban areas of the Byelorussian SSR (region III) |
| uzkitatu: | urban areas of the Central Asian Republics (region IV) |
| kazakh: | urban areas of the Kazakh SSR (region V) |
| grazarm: | urban areas of the Caucasian Republics (region VI) |
| eslali: | urban areas of the Baltic Republics (region VII) |
| rural: | all rural areas of the USSR (region VIII) |

# APPENDIX A

## Death rates.

| age | rsfsr | ukrmol | belssr | uzkltatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.008646 | 0.005649 | 0.004896 | 0.014126 | 0.009741 | 0.008787 | 0.004592 | 0.009536 |
| 5 | 0.000597 | 0.000486 | 0.000321 | 0.000682 | 0.000621 | 0.000565 | 0.000370 | 0.000714 |
| 10 | 0.000497 | 0.000405 | 0.000346 | 0.000561 | 0.000550 | 0.000442 | 0.000353 | 0.000586 |
| 15 | 0.000915 | 0.000696 | 0.000526 | 0.000878 | 0.001102 | 0.000586 | 0.000883 | 0.001455 |
| 20 | 0.001565 | 0.001158 | 0.000835 | 0.001467 | 0.001844 | 0.000973 | 0.001348 | 0.002923 |
| 25 | 0.002519 | 0.001584 | 0.001549 | 0.002440 | 0.002748 | 0.001476 | 0.001694 | 0.003155 |
| 30 | 0.001867 | 0.001458 | 0.001199 | 0.001893 | 0.001972 | 0.001132 | 0.002011 | 0.002550 |
| 35 | 0.004119 | 0.003645 | 0.002917 | 0.004181 | 0.004908 | 0.002560 | 0.003095 | 0.005121 |
| 40 | 0.004041 | 0.003295 | 0.003190 | 0.004204 | 0.004145 | 0.002850 | 0.003935 | 0.005081 |
| 45 | 0.008274 | 0.006887 | 0.005446 | 0.008744 | 0.009200 | 0.006688 | 0.006742 | 0.009314 |
| 50 | 0.010457 | 0.009968 | 0.009286 | 0.010721 | 0.011120 | 0.009728 | 0.010840 | 0.011967 |
| 55 | 0.009814 | 0.008885 | 0.009014 | 0.010410 | 0.012204 | 0.008770 | 0.009662 | 0.009212 |
| 60 | 0.015755 | 0.015537 | 0.013712 | 0.016034 | 0.017300 | 0.015003 | 0.014154 | 0.013842 |
| 65 | 0.025714 | 0.025006 | 0.020869 | 0.024104 | 0.025320 | 0.022817 | 0.023487 | 0.021003 |
| 70 | 0.039064 | 0.039236 | 0.034301 | 0.033462 | 0.036749 | 0.035689 | 0.039242 | 0.038365 |
| 75 | 0.064804 | 0.065090 | 0.056904 | 0.055511 | 0.060967 | 0.059197 | 0.065104 | 0.063643 |
| 80 | 0.099873 | 0.100315 | 0.087721 | 0.085544 | 0.093950 | 0.091239 | 0.100332 | 0.098084 |
| 85 | 0.170418 | 0.171170 | 0.149669 | 0.145969 | 0.160332 | 0.155675 | 0.171175 | 0.167365 |
| gross | 2.344697 | 2.302353 | 2.013499 | 2.104655 | 2.273872 | 2.120882 | 2.295092 | 2.319581 |
| crude | 0.008314 | 0.007960 | 0.005512 | 0.007052 | 0.006932 | 0.006306 | 0.008272 | 0.009934 |
| m.age | 76.2825 | 77.2938 | 77.3120 | 74.4151 | 75.3751 | 76.6023 | 77.3834 | 75.5283 |

## Fertility rates.

| age | rsfsr | ukrmol | belssr | uzkltatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 5 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 10 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 15 | 0.016749 | 0.017994 | 0.013857 | 0.018126 | 0.016741 | 0.016220 | 0.013535 | 0.021886 |
| 20 | 0.077330 | 0.084047 | 0.081721 | 0.119065 | 0.087264 | 0.100259 | 0.072186 | 0.145478 |
| 25 | 0.071825 | 0.064584 | 0.077331 | 0.126506 | 0.086992 | 0.112693 | 0.059174 | 0.107600 |
| 30 | 0.017628 | 0.020756 | 0.022514 | 0.047956 | 0.025231 | 0.029994 | 0.029552 | 0.041941 |
| 35 | 0.014791 | 0.017308 | 0.018578 | 0.053002 | 0.028780 | 0.028381 | 0.015591 | 0.044156 |
| 40 | 0.001807 | 0.001700 | 0.002614 | 0.015345 | 0.004758 | 0.005705 | 0.002832 | 0.012616 |
| 45 | 0.000187 | 0.000175 | 0.000279 | 0.003169 | 0.001119 | 0.000980 | 0.000246 | 0.002628 |
| 50 | 0.000008 | 0.000008 | 0.000007 | 0.001232 | 0.000194 | 0.000191 | 0.000006 | 0.000647 |
| 55 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 60 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 65 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 70 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 75 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 80 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 85 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| gross | 1.001627 | 1.032857 | 1.084505 | 1.922009 | 1.255389 | 1.472112 | 0.965611 | 1.884760 |
| crude | 0.015878 | 0.016219 | 0.019443 | 0.027094 | 0.020540 | 0.020851 | 0.015819 | 0.019537 |
| m.age | 26.0671 | 26.0762 | 26.5601 | 28.3261 | 27.1369 | 27.0932 | 26.7488 | 27.4018 |

Out-migration rates.

| | migration from rsfsr to | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
| 0 | 0.047507 | 0.035415 | 0.002806 | 0.000402 | 0.000786 | 0.001181 | 0.000113 | 0.000394 | 0.006409 |
| 5 | 0.030559 | 0.022861 | 0.001771 | 0.000250 | 0.000495 | 0.000779 | 0.000079 | 0.000268 | 0.004054 |
| 10 | 0.026898 | 0.020344 | 0.001535 | 0.000215 | 0.000317 | 0.000556 | 0.000065 | 0.000256 | 0.003610 |
| 15 | 0.181833 | 0.136330 | 0.010096 | 0.001558 | 0.002623 | 0.003475 | 0.000753 | 0.001119 | 0.025879 |
| 20 | 0.273972 | 0.205031 | 0.013938 | 0.001967 | 0.004453 | 0.005579 | 0.001142 | 0.001556 | 0.040306 |
| 25 | 0.174132 | 0.131021 | 0.008612 | 0.001157 | 0.002927 | 0.003450 | 0.000821 | 0.001083 | 0.025060 |
| 30 | 0.047261 | 0.035452 | 0.002412 | 0.000274 | 0.000802 | 0.000973 | 0.000217 | 0.000336 | 0.006794 |
| 35 | 0.066764 | 0.050620 | 0.003014 | 0.000339 | 0.001060 | 0.001401 | 0.000272 | 0.000357 | 0.009701 |
| 40 | 0.031772 | 0.024242 | 0.001250 | 0.000156 | 0.000502 | 0.000638 | 0.000148 | 0.000195 | 0.004642 |
| 45 | 0.038148 | 0.028938 | 0.001659 | 0.000184 | 0.000613 | 0.000813 | 0.000173 | 0.000213 | 0.005554 |
| 50 | 0.028837 | 0.021773 | 0.001325 | 0.000129 | 0.000460 | 0.000649 | 0.000163 | 0.000185 | 0.004154 |
| 55 | 0.018456 | 0.013970 | 0.000863 | 0.000076 | 0.000280 | 0.000400 | 0.000089 | 0.000112 | 0.002666 |
| 60 | 0.023912 | 0.018183 | 0.001130 | 0.000107 | 0.000281 | 0.000464 | 0.000066 | 0.000188 | 0.003492 |
| 65 | 0.024863 | 0.018883 | 0.001162 | 0.000117 | 0.000293 | 0.000495 | 0.000067 | 0.000221 | 0.003625 |
| 70 | 0.023482 | 0.017692 | 0.001195 | 0.000126 | 0.000290 | 0.000477 | 0.000068 | 0.000252 | 0.003383 |
| 75 | 0.023482 | 0.017693 | 0.001195 | 0.000126 | 0.000290 | 0.000477 | 0.000068 | 0.000252 | 0.003383 |
| 80 | 0.023482 | 0.017693 | 0.001195 | 0.000127 | 0.000289 | 0.000476 | 0.000068 | 0.000251 | 0.003382 |
| 85 | 0.023480 | 0.017691 | 0.001195 | 0.000124 | 0.000290 | 0.000478 | 0.000067 | 0.000252 | 0.003383 |
| gross | 5.544190 | 4.169159 | 0.281762 | 0.037174 | 0.085254 | 0.113802 | 0.022191 | 0.037451 | 0.797397 |
| crude | 0.080276 | 0.060312 | 0.004113 | 0.000562 | 0.001253 | 0.001640 | 0.000328 | 0.000511 | 0.011558 |
| m.age | 31.8199 | 31.8896 | 30.8867 | 28.4907 | 30.6614 | 31.5841 | 31.2854 | 34.2681 | 31.9981 |

| | migration from ukrmol to | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
| 0 | 0.043831 | 0.006022 | 0.030589 | 0.000351 | 0.000272 | 0.000525 | 0.000085 | 0.000271 | 0.005716 |
| 5 | 0.029148 | 0.004077 | 0.020251 | 0.000229 | 0.000178 | 0.000363 | 0.000062 | 0.000194 | 0.003793 |
| 10 | 0.026900 | 0.003845 | 0.018622 | 0.000208 | 0.000120 | 0.000275 | 0.000053 | 0.000198 | 0.003578 |
| 15 | 0.193190 | 0.027644 | 0.131931 | 0.001621 | 0.001070 | 0.001841 | 0.000633 | 0.000925 | 0.027523 |
| 20 | 0.278418 | 0.042100 | 0.183662 | 0.002073 | 0.001887 | 0.002992 | 0.001015 | 0.001280 | 0.043410 |
| 25 | 0.140465 | 0.021811 | 0.091938 | 0.000989 | 0.001009 | 0.001500 | 0.000606 | 0.000732 | 0.021881 |
| 30 | 0.042222 | 0.006401 | 0.027945 | 0.000254 | 0.000301 | 0.000459 | 0.000178 | 0.000250 | 0.006434 |
| 35 | 0.061983 | 0.010286 | 0.039267 | 0.000354 | 0.000447 | 0.000744 | 0.000249 | 0.000296 | 0.010340 |
| 40 | 0.026211 | 0.004747 | 0.015722 | 0.000157 | 0.000201 | 0.000326 | 0.000133 | 0.000156 | 0.004769 |
| 45 | 0.030533 | 0.005183 | 0.019059 | 0.000171 | 0.000225 | 0.000380 | 0.000142 | 0.000156 | 0.005218 |
| 50 | 0.024622 | 0.004015 | 0.015703 | 0.000122 | 0.000171 | 0.000313 | 0.000140 | 0.000140 | 0.004017 |
| 55 | 0.015724 | 0.002550 | 0.010098 | 0.000071 | 0.000104 | 0.000190 | 0.000075 | 0.000084 | 0.002552 |
| 60 | 0.020865 | 0.003379 | 0.013453 | 0.000102 | 0.000105 | 0.000225 | 0.000056 | 0.000144 | 0.003403 |
| 65 | 0.020972 | 0.003414 | 0.013453 | 0.000108 | 0.000106 | 0.000233 | 0.000054 | 0.000164 | 0.003438 |
| 70 | 0.020370 | 0.003114 | 0.013453 | 0.000113 | 0.000104 | 0.000221 | 0.000056 | 0.000185 | 0.003124 |
| 75 | 0.020372 | 0.003115 | 0.013454 | 0.000113 | 0.000105 | 0.000220 | 0.000057 | 0.000184 | 0.003124 |
| 80 | 0.020362 | 0.003113 | 0.013454 | 0.000111 | 0.000103 | 0.000219 | 0.000058 | 0.000183 | 0.003122 |
| 85 | 0.020387 | 0.003118 | 0.013450 | 0.000117 | 0.000108 | 0.000225 | 0.000054 | 0.000189 | 0.003127 |
| gross | 5.182871 | 0.789674 | 3.427519 | 0.036318 | 0.033080 | 0.056252 | 0.018532 | 0.028661 | 0.792836 |
| crude | 0.074290 | 0.011249 | 0.049266 | 0.000538 | 0.000479 | 0.000799 | 0.000267 | 0.000387 | 0.011306 |
| m.age | 30.7447 | 31.4187 | 30.4063 | 28.1156 | 30.3021 | 31.1922 | 31.3591 | 33.9368 | 31.5133 |

APPENDIX A *Continued.*

migration from belssr to

| age | total | rsfsr | ukrmol | belssr | uzkltatu | kazakh | grazarm | eslall | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.050733 | 0.006596 | 0.002351 | 0.033854 | 0.000240 | 0.000466 | 0.000043 | 0.001322 | 0.005862 |
| 5 | 0.033899 | 0.004523 | 0.001576 | 0.022376 | 0.000163 | 0.000326 | 0.000033 | 0.000967 | 0.003936 |
| 10 | 0.031147 | 0.004261 | 0.001444 | 0.020352 | 0.000107 | 0.000247 | 0.000030 | 0.000994 | 0.003713 |
| 15 | 0.220306 | 0.028688 | 0.009529 | 0.148196 | 0.000914 | 0.001551 | 0.000379 | 0.004317 | 0.026731 |
| 20 | 0.280984 | 0.041042 | 0.012540 | 0.177923 | 0.001495 | 0.002368 | 0.000537 | 0.005472 | 0.039606 |
| 25 | 0.157118 | 0.024241 | 0.007167 | 0.096729 | 0.000909 | 0.001353 | 0.000341 | 0.003619 | 0.022759 |
| 30 | 0.085206 | 0.007497 | 0.002293 | 0.026206 | 0.000284 | 0.000436 | 0.000097 | 0.001339 | 0.007054 |
| 35 | 0.065504 | 0.011968 | 0.003207 | 0.036267 | 0.000426 | 0.000703 | 0.000139 | 0.001536 | 0.011258 |
| 40 | 0.032752 | 0.006141 | 0.001423 | 0.017867 | 0.000211 | 0.000343 | 0.000082 | 0.000910 | 0.005775 |
| 45 | 0.037224 | 0.006992 | 0.001805 | 0.020144 | 0.000243 | 0.000416 | 0.000086 | 0.000950 | 0.006588 |
| 50 | 0.030396 | 0.005898 | 0.001613 | 0.015772 | 0.000202 | 0.000371 | 0.000088 | 0.000925 | 0.005527 |
| 55 | 0.022693 | 0.004614 | 0.001278 | 0.011317 | 0.000156 | 0.000279 | 0.000058 | 0.000668 | 0.004322 |
| 60 | 0.032136 | 0.006221 | 0.001740 | 0.016559 | 0.000156 | 0.000338 | 0.000050 | 0.001208 | 0.005864 |
| 65 | 0.031524 | 0.005933 | 0.001637 | 0.016564 | 0.000147 | 0.000327 | 0.000041 | 0.001285 | 0.005590 |
| 70 | 0.029974 | 0.005146 | 0.001565 | 0.016573 | 0.000137 | 0.000305 | 0.000042 | 0.001386 | 0.004821 |
| 75 | 0.029949 | 0.005141 | 0.001561 | 0.016563 | 0.000147 | 0.000312 | 0.000037 | 0.001377 | 0.004811 |
| 80 | 0.029956 | 0.005155 | 0.001562 | 0.016560 | 0.000156 | 0.000312 | 0.000039 | 0.001367 | 0.004804 |
| 85 | 0.030060 | 0.005115 | 0.001574 | 0.016604 | 0.000157 | 0.000315 | 0.000079 | 0.001416 | 0.004800 |
| gross | 5.957810 | 0.925868 | 0.279323 | 3.632134 | 0.031258 | 0.053841 | 0.011004 | 0.155282 | 0.869099 |
| crude | 0.092477 | 0.013768 | 0.004219 | 0.057983 | 0.000477 | 0.000794 | 0.000170 | 0.002114 | 0.012951 |
| m.age | 32.7194 | 35.0485 | 34.0317 | 31.1490 | 33.7155 | 35.0623 | 33.9045 | 38.6128 | 35.1303 |

migration from uzkltatu to

| age | total | rsfsr | ukrmol | belssr | uzkltatu | kazakh | grazarm | eslall | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.020039 | 0.003662 | 0.000579 | 0.000069 | 0.011114 | 0.001143 | 0.000050 | 0.000063 | 0.003360 |
| 5 | 0.014250 | 0.002645 | 0.000409 | 0.000047 | 0.007842 | 0.000843 | 0.000037 | 0.000047 | 0.002378 |
| 10 | 0.012597 | 0.002798 | 0.000423 | 0.000049 | 0.006001 | 0.000716 | 0.000037 | 0.000054 | 0.002519 |
| 15 | 0.122377 | 0.024238 | 0.003598 | 0.000455 | 0.064021 | 0.005778 | 0.000651 | 0.000303 | 0.023333 |
| 20 | 0.230059 | 0.042663 | 0.005812 | 0.000672 | 0.125961 | 0.010854 | 0.001074 | 0.000488 | 0.042534 |
| 25 | 0.148907 | 0.027413 | 0.003608 | 0.000398 | 0.083111 | 0.006750 | 0.000686 | 0.000347 | 0.026594 |
| 30 | 0.043668 | 0.007975 | 0.001089 | 0.000101 | 0.024416 | 0.002045 | 0.000174 | 0.000119 | 0.007750 |
| 35 | 0.063078 | 0.012069 | 0.001440 | 0.000134 | 0.034208 | 0.003124 | 0.000242 | 0.000130 | 0.011732 |
| 40 | 0.030943 | 0.005979 | 0.000619 | 0.000064 | 0.016805 | 0.001470 | 0.000127 | 0.000071 | 0.005807 |
| 45 | 0.041686 | 0.007896 | 0.000905 | 0.000082 | 0.022786 | 0.002071 | 0.000167 | 0.000091 | 0.007688 |
| 50 | 0.029778 | 0.005617 | 0.000684 | 0.000052 | 0.016219 | 0.001566 | 0.000139 | 0.000072 | 0.005430 |
| 55 | 0.020352 | 0.003957 | 0.000486 | 0.000034 | 0.010872 | 0.001058 | 0.000072 | 0.000045 | 0.003826 |
| 60 | 0.023010 | 0.005110 | 0.000637 | 0.000051 | 0.010867 | 0.001219 | 0.000070 | 0.000083 | 0.004973 |
| 65 | 0.023482 | 0.005210 | 0.000636 | 0.000049 | 0.011087 | 0.001276 | 0.000053 | 0.000102 | 0.005068 |
| 70 | 0.022420 | 0.004852 | 0.000656 | 0.000061 | 0.010729 | 0.001227 | 0.000080 | 0.000098 | 0.004717 |
| 75 | 0.022415 | 0.004858 | 0.000654 | 0.000064 | 0.010725 | 0.001223 | 0.000075 | 0.000097 | 0.004719 |
| 80 | 0.022424 | 0.004859 | 0.000662 | 0.000068 | 0.010722 | 0.001232 | 0.000068 | 0.000091 | 0.004722 |
| 85 | 0.022429 | 0.004872 | 0.000643 | 0.000046 | 0.010709 | 0.001241 | 0.000092 | 0.000092 | 0.004734 |
| gross | 4.569569 | 0.883363 | 0.117706 | 0.012483 | 2.440964 | 0.224186 | 0.019489 | 0.011949 | 0.859429 |
| crude | 0.061099 | 0.011650 | 0.001592 | 0.000178 | 0.032973 | 0.002962 | 0.000270 | 0.000150 | 0.011323 |
| m.age | 34.7286 | 35.6127 | 34.7128 | 32.1893 | 34.0218 | 35.5264 | 32.8805 | 38.3308 | 35.6499 |

migration from kazakh to

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.046068 | 0.009369 | 0.002026 | 0.000279 | 0.001909 | 0.026312 | 0.000061 | 0.000137 | 0.005975 |
| 5 | 0.030812 | 0.006216 | 0.001315 | 0.000178 | 0.001244 | 0.017835 | 0.000044 | 0.000096 | 0.003885 |
| 10 | 0.024693 | 0.005698 | 0.001187 | 0.000158 | 0.000832 | 0.013124 | 0.000036 | 0.000094 | 0.003563 |
| 15 | 0.194448 | 0.045755 | 0.009562 | 0.001371 | 0.007903 | 0.098213 | 0.000534 | 0.000500 | 0.030611 |
| 20 | 0.306348 | 0.069533 | 0.013138 | 0.001749 | 0.012953 | 0.159320 | 0.000805 | 0.000676 | 0.048174 |
| 25 | 0.194403 | 0.045116 | 0.008124 | 0.001044 | 0.008629 | 0.100015 | 0.000574 | 0.000408 | 0.030412 |
| 30 | 0.054621 | 0.012390 | 0.002317 | 0.000251 | 0.002359 | 0.028630 | 0.000150 | 0.000156 | 0.008368 |
| 35 | 0.090042 | 0.020539 | 0.003341 | 0.000362 | 0.003658 | 0.047857 | 0.000217 | 0.000191 | 0.013877 |
| 40 | 0.040784 | 0.009593 | 0.001373 | 0.000160 | 0.001714 | 0.021247 | 0.000116 | 0.000103 | 0.006477 |
| 45 | 0.058188 | 0.013153 | 0.002071 | 0.000221 | 0.002456 | 0.031106 | 0.000155 | 0.000129 | 0.008896 |
| 50 | 0.045571 | 0.009936 | 0.001692 | 0.000155 | 0.001878 | 0.024966 | 0.000146 | 0.000115 | 0.006684 |
| 55 | 0.034007 | 0.007616 | 0.001279 | 0.000108 | 0.001367 | 0.018337 | 0.000096 | 0.000079 | 0.005125 |
| 60 | 0.040371 | 0.009684 | 0.001637 | 0.000148 | 0.001353 | 0.020794 | 0.000068 | 0.000133 | 0.006555 |
| 65 | 0.039855 | 0.009422 | 0.001576 | 0.000152 | 0.001319 | 0.020794 | 0.000071 | 0.000147 | 0.006376 |
| 70 | 0.039580 | 0.009171 | 0.001674 | 0.000167 | 0.001354 | 0.020795 | 0.000073 | 0.000167 | 0.006179 |
| 75 | 0.039576 | 0.009162 | 0.001680 | 0.000165 | 0.001349 | 0.020793 | 0.000076 | 0.000165 | 0.006185 |
| 80 | 0.039572 | 0.009176 | 0.001678 | 0.000162 | 0.001353 | 0.020788 | 0.000081 | 0.000162 | 0.006171 |
| 85 | 0.039538 | 0.009162 | 0.001691 | 0.000164 | 0.001363 | 0.020778 | 0.000055 | 0.000164 | 0.006162 |
| gross | 6.792383 | 1.553454 | 0.286804 | 0.034973 | 0.274960 | 3.558513 | 0.016786 | 0.018520 | 1.048372 |
| crude | 0.096067 | 0.021925 | 0.004146 | 0.000535 | 0.003977 | 0.050187 | 0.000245 | 0.000243 | 0.014808 |
| m.age | 35.4573 | 35.6850 | 34.5611 | 31.6785 | 34.1727 | 35.4691 | 34.0605 | 38.8338 | 35.7507 |

migration from grazarm to

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.011502 | 0.002850 | 0.000843 | 0.000075 | 0.000277 | 0.000186 | 0.005749 | 0.000075 | 0.001446 |
| 5 | 0.007617 | 0.001827 | 0.000529 | 0.000047 | 0.000166 | 0.000121 | 0.003961 | 0.000056 | 0.000909 |
| 10 | 0.007402 | 0.001892 | 0.000530 | 0.000047 | 0.000122 | 0.000101 | 0.003711 | 0.000058 | 0.000940 |
| 15 | 0.086582 | 0.015904 | 0.004371 | 0.000431 | 0.001215 | 0.000789 | 0.055086 | 0.000323 | 0.008463 |
| 20 | 0.149131 | 0.027031 | 0.006843 | 0.000615 | 0.002598 | 0.001428 | 0.095217 | 0.000507 | 0.014892 |
| 25 | 0.105621 | 0.018284 | 0.004485 | 0.000383 | 0.001822 | 0.000935 | 0.069539 | 0.000370 | 0.009804 |
| 30 | 0.025036 | 0.004491 | 0.001141 | 0.000082 | 0.000459 | 0.000239 | 0.016101 | 0.000110 | 0.002413 |
| 35 | 0.031841 | 0.006195 | 0.001378 | 0.000098 | 0.000575 | 0.000333 | 0.019829 | 0.000106 | 0.003327 |
| 40 | 0.017669 | 0.003212 | 0.000617 | 0.000048 | 0.000294 | 0.000165 | 0.011544 | 0.000065 | 0.001724 |
| 45 | 0.022926 | 0.004216 | 0.000900 | 0.000062 | 0.000382 | 0.000231 | 0.014788 | 0.000080 | 0.002268 |
| 50 | 0.020761 | 0.003340 | 0.000750 | 0.000043 | 0.000296 | 0.000196 | 0.014282 | 0.000067 | 0.001787 |
| 55 | 0.012068 | 0.002174 | 0.000499 | 0.000027 | 0.000173 | 0.000119 | 0.007877 | 0.000038 | 0.001162 |
| 60 | 0.011603 | 0.002811 | 0.000659 | 0.000043 | 0.000167 | 0.000142 | 0.006193 | 0.000074 | 0.001514 |
| 65 | 0.011697 | 0.002861 | 0.000652 | 0.000040 | 0.000178 | 0.000143 | 0.006207 | 0.000074 | 0.001542 |
| 70 | 0.011521 | 0.002658 | 0.000671 | 0.000047 | 0.000176 | 0.000149 | 0.006293 | 0.000102 | 0.001424 |
| 75 | 0.011500 | 0.002656 | 0.000664 | 0.000047 | 0.000178 | 0.000142 | 0.006295 | 0.000095 | 0.001423 |
| 80 | 0.011525 | 0.002648 | 0.000681 | 0.000050 | 0.000177 | 0.000151 | 0.006305 | 0.000101 | 0.001412 |
| 85 | 0.011483 | 0.002642 | 0.000661 | 0.000051 | 0.000152 | 0.000152 | 0.006300 | 0.000102 | 0.001423 |
| gross | 2.837423 | 0.538459 | 0.134374 | 0.011179 | 0.047032 | 0.028617 | 1.776385 | 0.012019 | 0.289357 |
| crude | 0.038527 | 0.007229 | 0.001836 | 0.000159 | 0.000646 | 0.000382 | 0.024240 | 0.000152 | 0.003883 |
| m.age | 33.0968 | 34.0434 | 33.1764 | 30.9601 | 32.1864 | 34.2193 | 32.6319 | 37.4455 | 34.0916 |

APPENDIX A *Continued.*

| | migration from eslali to | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
| 0 | 0.042481 | 0.003583 | 0.001062 | 0.000485 | 0.000122 | 0.000150 | 0.000041 | 0.031390 | 0.005647 |
| 5 | 0.032161 | 0.002619 | 0.000756 | 0.000342 | 0.000091 | 0.000110 | 0.000031 | 0.024172 | 0.004040 |
| 10 | 0.038115 | 0.002637 | 0.000743 | 0.000328 | 0.000058 | 0.000089 | 0.000025 | 0.026166 | 0.004070 |
| 15 | 0.194134 | 0.020131 | 0.005593 | 0.002728 | 0.000590 | 0.000642 | 0.000340 | 0.130813 | 0.033297 |
| 20 | 0.246764 | 0.027740 | 0.007080 | 0.003156 | 0.000869 | 0.000945 | 0.000479 | 0.158958 | 0.047537 |
| 25 | 0.107604 | 0.011281 | 0.002777 | 0.001181 | 0.000370 | 0.000373 | 0.000227 | 0.072596 | 0.018800 |
| 30 | 0.048675 | 0.004585 | 0.001169 | 0.000422 | 0.000155 | 0.000157 | 0.000094 | 0.034434 | 0.007658 |
| 35 | 0.047332 | 0.005645 | 0.001251 | 0.000447 | 0.000178 | 0.000195 | 0.000101 | 0.030117 | 0.009399 |
| 40 | 0.027590 | 0.002998 | 0.000583 | 0.000229 | 0.000086 | 0.000100 | 0.000066 | 0.018526 | 0.005004 |
| 45 | 0.029399 | 0.003426 | 0.000741 | 0.000261 | 0.000107 | 0.000119 | 0.000073 | 0.018932 | 0.005740 |
| 50 | 0.025448 | 0.002684 | 0.000619 | 0.000190 | 0.000080 | 0.000098 | 0.000061 | 0.017286 | 0.004430 |
| 55 | 0.017400 | 0.001914 | 0.000446 | 0.000124 | 0.000059 | 0.000070 | 0.000043 | 0.011555 | 0.003189 |
| 60 | 0.027353 | 0.002406 | 0.000555 | 0.000169 | 0.000063 | 0.000077 | 0.000014 | 0.020052 | 0.004017 |
| 65 | 0.026309 | 0.002156 | 0.000499 | 0.000160 | 0.000053 | 0.000071 | 0.000012 | 0.019745 | 0.003612 |
| 70 | 0.025048 | 0.001787 | 0.000443 | 0.000145 | 0.000051 | 0.000058 | 0.000022 | 0.019548 | 0.002993 |
| 75 | 0.025071 | 0.001791 | 0.000445 | 0.000152 | 0.000051 | 0.000064 | 0.000025 | 0.019546 | 0.002997 |
| 80 | 0.025043 | 0.001783 | 0.000432 | 0.000135 | 0.000054 | 0.000054 | 0.000027 | 0.019559 | 0.002999 |
| 85 | 0.025037 | 0.001796 | 0.000435 | 0.000163 | 0.000054 | 0.000054 | 0.000000 | 0.019540 | 0.002994 |
| gross | 5.034819 | 0.504814 | 0.128144 | 0.054089 | 0.015449 | 0.017136 | 0.008406 | 3.464669 | 0.842111 |
| crude | 0.070143 | 0.007248 | 0.001853 | 0.000801 | 0.000223 | 0.000246 | 0.000125 | 0.047546 | 0.012101 |
| m.age | 32.2217 | 30.8887 | 29.7660 | 27.5401 | 30.4648 | 30.5080 | 29.6711 | 32.8999 | 30.9972 |

| | migration from rural to | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
| 0 | 0.024653 | 0.009182 | 0.003318 | 0.000867 | 0.000752 | 0.001042 | 0.000175 | 0.000661 | 0.008656 |
| 5 | 0.014876 | 0.005591 | 0.001975 | 0.000509 | 0.000449 | 0.000648 | 0.000114 | 0.000425 | 0.005164 |
| 10 | 0.013981 | 0.005357 | 0.001849 | 0.000471 | 0.000314 | 0.000498 | 0.000101 | 0.000439 | 0.004951 |
| 15 | 0.177156 | 0.066268 | 0.022575 | 0.006296 | 0.004784 | 0.005746 | 0.002401 | 0.003562 | 0.065522 |
| 20 | 0.411892 | 0.154384 | 0.048035 | 0.012309 | 0.012174 | 0.014289 | 0.005353 | 0.007265 | 0.158082 |
| 25 | 0.198301 | 0.075431 | 0.022629 | 0.005536 | 0.006094 | 0.006755 | 0.002711 | 0.003998 | 0.075148 |
| 30 | 0.050072 | 0.018939 | 0.005921 | 0.001217 | 0.001533 | 0.001768 | 0.000616 | 0.001174 | 0.018903 |
| 35 | 0.062249 | 0.024239 | 0.006583 | 0.001351 | 0.001816 | 0.002281 | 0.000709 | 0.001073 | 0.024196 |
| 40 | 0.028009 | 0.011049 | 0.002609 | 0.000591 | 0.000828 | 0.000992 | 0.000356 | 0.000565 | 0.011021 |
| 45 | 0.034056 | 0.013280 | 0.003477 | 0.000704 | 0.001028 | 0.001269 | 0.000414 | 0.000608 | 0.013276 |
| 50 | 0.025336 | 0.009775 | 0.002729 | 0.000480 | 0.000764 | 0.000992 | 0.000362 | 0.000521 | 0.009712 |
| 55 | 0.014793 | 0.005746 | 0.001618 | 0.000259 | 0.000431 | 0.000559 | 0.000181 | 0.000287 | 0.005712 |
| 60 | 0.016480 | 0.006423 | 0.001817 | 0.000315 | 0.000374 | 0.000557 | 0.000128 | 0.000442 | 0.006425 |
| 65 | 0.015058 | 0.005850 | 0.001638 | 0.000300 | 0.000343 | 0.000521 | 0.000114 | 0.000441 | 0.005850 |
| 70 | 0.013065 | 0.004972 | 0.001527 | 0.000295 | 0.000309 | 0.000455 | 0.000106 | 0.000450 | 0.004951 |
| 75 | 0.013064 | 0.004972 | 0.001526 | 0.000295 | 0.000309 | 0.000455 | 0.000106 | 0.000449 | 0.004951 |
| 80 | 0.013064 | 0.004972 | 0.001527 | 0.000295 | 0.000310 | 0.000455 | 0.000106 | 0.000449 | 0.004951 |
| 85 | 0.013065 | 0.004973 | 0.001527 | 0.000295 | 0.000309 | 0.000455 | 0.000106 | 0.000451 | 0.004951 |
| gross | 5.695847 | 2.157009 | 0.664413 | 0.161927 | 0.164608 | 0.198684 | 0.070796 | 0.116304 | 2.162105 |
| crude | 0.062360 | 0.023594 | 0.007367 | 0.001828 | 0.001795 | 0.002182 | 0.000768 | 0.001276 | 0.023550 |
| m.age | 29.2727 | 29.4280 | 28.6629 | 27.0026 | 28.7574 | 29.3622 | 28.2475 | 31.0625 | 29.4435 |

Death rates.

| age | urban | rural |
|---|---|---|
| 0 | 0.008423 | 0.009536 |
| 5 | 0.000568 | 0.000714 |
| 10 | 0.000477 | 0.000586 |
| 15 | 0.000853 | 0.001455 |
| 20 | 0.001443 | 0.002923 |
| 25 | 0.002219 | 0.003155 |
| 30 | 0.001740 | 0.002550 |
| 35 | 0.003927 | 0.005121 |
| 40 | 0.003830 | 0.005081 |
| 45 | 0.007846 | 0.009314 |
| 50 | 0.010347 | 0.011967 |
| 55 | 0.009663 | 0.009212 |
| 60 | 0.015658 | 0.013842 |
| 65 | 0.025188 | 0.021003 |
| 70 | 0.038543 | 0.038365 |
| 75 | 0.063940 | 0.063643 |
| 80 | 0.098541 | 0.098084 |
| 85 | 0.168145 | 0.167365 |
| gross | 2.306749 | 2.319581 |
| crude | 0.007923 | 0.009934 |
| m.age | 76.4032 | 75.5283 |

Fertility rates.

| age | urban | rural |
|---|---|---|
| 0 | 0.000000 | 0.000000 |
| 5 | 0.000000 | 0.000000 |
| 10 | 0.000000 | 0.000000 |
| 15 | 0.016866 | 0.021886 |
| 20 | 0.082401 | 0.145478 |
| 25 | 0.075145 | 0.107600 |
| 30 | 0.021195 | 0.041941 |
| 35 | 0.018531 | 0.044156 |
| 40 | 0.002782 | 0.012616 |
| 45 | 0.000384 | 0.002628 |
| 50 | 0.000078 | 0.000647 |
| 55 | 0.000000 | 0.000000 |
| 60 | 0.000000 | 0.000000 |
| 65 | 0.000000 | 0.000000 |
| 70 | 0.000000 | 0.000000 |
| 75 | 0.000000 | 0.000000 |
| 80 | 0.000000 | 0.000000 |
| 85 | 0.000000 | 0.000000 |
| gross | 1.086910 | 1.884760 |
| crude | 0.017162 | 0.019537 |
| m.age | 26.4050 | 27.4018 |

Out-migration rates.

| | migration from | urban to | |
|---|---|---|---|
| age | total | urban | rural |
| 0 | 0.041804 | 0.036194 | 0.005609 |
| 5 | 0.027560 | 0.023917 | 0.003643 |
| 10 | 0.024866 | 0.021486 | 0.003380 |
| 15 | 0.177817 | 0.152175 | 0.025642 |
| 20 | 0.268277 | 0.227783 | 0.040494 |
| 25 | 0.160792 | 0.136978 | 0.023814 |
| 30 | 0.045425 | 0.038736 | 0.006689 |
| 35 | 0.064448 | 0.054600 | 0.009849 |
| 40 | 0.030367 | 0.025643 | 0.004724 |
| 45 | 0.036609 | 0.030993 | 0.005616 |
| 50 | 0.028324 | 0.024082 | 0.004242 |
| 55 | 0.018317 | 0.015547 | 0.002770 |
| 60 | 0.023625 | 0.019989 | 0.003635 |
| 65 | 0.024234 | 0.020520 | 0.003715 |
| 70 | 0.023097 | 0.019668 | 0.003429 |
| 75 | 0.023097 | 0.019667 | 0.003429 |
| 80 | 0.023095 | 0.019667 | 0.003428 |
| 85 | 0.023099 | 0.019669 | 0.003430 |
| gross | 5.324263 | 4.536578 | 0.787685 |
| crude | 0.076904 | 0.065547 | 0.011357 |
| m.age | 32.0778 | 32.0157 | 32.4353 |

| | migration from | rural to | |
|---|---|---|---|
| age | total | urban | rural |
| 0 | 0.024653 | 0.015997 | 0.008656 |
| 5 | 0.014876 | 0.009711 | 0.005164 |
| 10 | 0.013981 | 0.009029 | 0.004951 |
| 15 | 0.177156 | 0.111633 | 0.065522 |
| 20 | 0.411892 | 0.253811 | 0.158082 |
| 25 | 0.198301 | 0.123153 | 0.075148 |
| 30 | 0.050072 | 0.031168 | 0.018903 |
| 35 | 0.062249 | 0.038053 | 0.024196 |
| 40 | 0.028009 | 0.016989 | 0.011021 |
| 45 | 0.034056 | 0.020780 | 0.013276 |
| 50 | 0.025336 | 0.015624 | 0.009712 |
| 55 | 0.014793 | 0.009081 | 0.005712 |
| 60 | 0.016480 | 0.010055 | 0.006425 |
| 65 | 0.015058 | 0.009208 | 0.005850 |
| 70 | 0.013065 | 0.008114 | 0.004951 |
| 75 | 0.013064 | 0.008113 | 0.004951 |
| 80 | 0.013064 | 0.008114 | 0.004951 |
| 85 | 0.013065 | 0.008115 | 0.004951 |
| gross | 5.695846 | 3.533741 | 2.162105 |
| crude | 0.062360 | 0.038810 | 0.023550 |
| m.age | 29.2727 | 29.1682 | 29.4435 |

*Appendix B*

# PROBABILITIES OF DYING AND MIGRATING, AND EXPECTED NUMBER OF SURVIVORS AT EACH AGE, TOTAL POPULATION, 1974

## APPENDIX B

Probabilities of dying and migrating.

region rsfsr

| age | death | migration from rsfsr to rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.042311 | 0.902439 | 0.013022 | 0.001891 | 0.003621 | 0.005332 | 0.000535 | 0.001864 | 0.028986 |
| 5 | 0.002985 | 0.959819 | 0.008596 | 0.001223 | 0.002420 | 0.003736 | 0.000391 | 0.001317 | 0.019513 |
| 10 | 0.002485 | 0.965724 | 0.007478 | 0.001054 | 0.001553 | 0.002684 | 0.000320 | 0.001258 | 0.017444 |
| 15 | 0.004665 | 0.812009 | 0.044928 | 0.007494 | 0.011728 | 0.014110 | 0.003803 | 0.005287 | 0.095976 |
| 20 | 0.008104 | 0.750334 | 0.061634 | 0.010065 | 0.019056 | 0.021587 | 0.005995 | 0.007614 | 0.115611 |
| 25 | 0.012538 | 0.815249 | 0.039785 | 0.005772 | 0.012899 | 0.014142 | 0.004066 | 0.005472 | 0.090078 |
| 30 | 0.009327 | 0.935737 | 0.011720 | 0.001365 | 0.003835 | 0.004561 | 0.001081 | 0.001664 | 0.030710 |
| 35 | 0.020472 | 0.906905 | 0.014223 | 0.001651 | 0.004917 | 0.006254 | 0.001338 | 0.001750 | 0.042490 |
| 40 | 0.020045 | 0.944545 | 0.006027 | 0.000761 | 0.002390 | 0.002992 | 0.000728 | 0.000953 | 0.021559 |
| 45 | 0.040566 | 0.917339 | 0.007841 | 0.000885 | 0.002835 | 0.003667 | 0.000829 | 0.001024 | 0.025015 |
| 50 | 0.051017 | 0.916689 | 0.006203 | 0.000607 | 0.002127 | 0.002939 | 0.000772 | 0.000874 | 0.018771 |
| 55 | 0.047879 | 0.931219 | 0.004080 | 0.000358 | 0.001309 | 0.001825 | 0.000422 | 0.000531 | 0.012376 |
| 60 | 0.075715 | 0.898417 | 0.005154 | 0.000488 | 0.001269 | 0.002042 | 0.000303 | 0.000869 | 0.015743 |
| 65 | 0.120602 | 0.853494 | 0.005052 | 0.000510 | 0.001263 | 0.002090 | 0.000296 | 0.000972 | 0.015722 |
| 70 | 0.177891 | 0.798594 | 0.004876 | 0.000517 | 0.001189 | 0.001902 | 0.000282 | 0.001037 | 0.013713 |
| 75 | 0.278769 | 0.700197 | 0.004353 | 0.000464 | 0.001069 | 0.001706 | 0.000252 | 0.000926 | 0.012264 |
| 80 | 0.399500 | 0.582257 | 0.003769 | 0.000407 | 0.000933 | 0.001482 | 0.000220 | 0.000799 | 0.010632 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

region ukrmol

| age | death | migration from rsfsr | ukrmol to ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.028360 | 0.028019 | 0.910228 | 0.001673 | 0.001339 | 0.002480 | 0.000409 | 0.001321 | 0.026170 |
| 5 | 0.002442 | 0.019820 | 0.954348 | 0.001123 | 0.000906 | 0.001784 | 0.000311 | 0.000966 | 0.018299 |
| 10 | 0.002034 | 0.018761 | 0.957667 | 0.001024 | 0.000608 | 0.001354 | 0.000266 | 0.000984 | 0.017302 |
| 15 | 0.003744 | 0.124797 | 0.739914 | 0.007788 | 0.006001 | 0.008588 | 0.003360 | 0.004634 | 0.101175 |
| 20 | 0.006532 | 0.190973 | 0.631377 | 0.010565 | 0.011161 | 0.014318 | 0.005634 | 0.006853 | 0.122588 |
| 25 | 0.008474 | 0.102463 | 0.783643 | 0.005069 | 0.005686 | 0.007282 | 0.003185 | 0.004034 | 0.080163 |
| 30 | 0.007380 | 0.031267 | 0.924927 | 0.001272 | 0.001557 | 0.002265 | 0.000897 | 0.001270 | 0.029165 |
| 35 | 0.018288 | 0.048878 | 0.877447 | 0.001724 | 0.002281 | 0.003526 | 0.001241 | 0.001487 | 0.045128 |
| 40 | 0.016489 | 0.022973 | 0.933593 | 0.000765 | 0.001010 | 0.001580 | 0.000655 | 0.000774 | 0.022160 |
| 45 | 0.034089 | 0.024599 | 0.912536 | 0.000824 | 0.001109 | 0.001787 | 0.000690 | 0.000764 | 0.023603 |
| 50 | 0.048746 | 0.018857 | 0.910011 | 0.000577 | 0.000832 | 0.001460 | 0.000668 | 0.000672 | 0.018176 |
| 55 | 0.043509 | 0.012073 | 0.930057 | 0.000336 | 0.000502 | 0.000886 | 0.000359 | 0.000402 | 0.011875 |
| 60 | 0.074724 | 0.015439 | 0.891597 | 0.000465 | 0.000489 | 0.001012 | 0.000258 | 0.000669 | 0.015346 |
| 65 | 0.117550 | 0.014871 | 0.849710 | 0.000475 | 0.000473 | 0.001008 | 0.000240 | 0.000731 | 0.014941 |
| 70 | 0.178609 | 0.012728 | 0.793190 | 0.000464 | 0.000440 | 0.000896 | 0.000235 | 0.000767 | 0.012670 |
| 75 | 0.279834 | 0.011369 | 0.694956 | 0.000419 | 0.000397 | 0.000801 | 0.000211 | 0.000683 | 0.011329 |
| 80 | 0.400923 | 0.009828 | 0.577274 | 0.000360 | 0.000339 | 0.000691 | 0.000188 | 0.000585 | 0.009811 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

region belssr
**********

| age | death | migration from belssr to rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.024846 | 0.030596 | 0.011092 | 0.896848 | 0.001200 | 0.002224 | 0.000222 | 0.006110 | 0.026861 |
| 5 | 0.001641 | 0.021916 | 0.007677 | 0.942529 | 0.000835 | 0.001612 | 0.000168 | 0.004639 | 0.018984 |
| 10 | 0.001750 | 0.020722 | 0.007049 | 0.945844 | 0.000547 | 0.001220 | 0.000153 | 0.004771 | 0.017943 |
| 15 | 0.003030 | 0.128164 | 0.043017 | 0.694651 | 0.005393 | 0.007570 | 0.002355 | 0.016927 | 0.098894 |
| 20 | 0.005217 | 0.185556 | 0.057307 | 0.591571 | 0.009676 | 0.012276 | 0.003885 | 0.020271 | 0.114242 |
| 25 | 0.008357 | 0.111494 | 0.034182 | 0.733243 | 0.005363 | 0.006809 | 0.002145 | 0.015469 | 0.082939 |
| 30 | 0.006173 | 0.036307 | 0.011203 | 0.903990 | 0.001491 | 0.002177 | 0.000524 | 0.006252 | 0.031883 |
| 35 | 0.014969 | 0.056250 | 0.015137 | 0.851410 | 0.002211 | 0.003382 | 0.000754 | 0.006951 | 0.048936 |
| 40 | 0.016025 | 0.029438 | 0.006852 | 0.913587 | 0.001066 | 0.001667 | 0.000422 | 0.004268 | 0.026675 |
| 45 | 0.027451 | 0.032887 | 0.008567 | 0.893446 | 0.001213 | 0.001967 | 0.000442 | 0.004374 | 0.029654 |
| 50 | 0.045659 | 0.027400 | 0.007531 | 0.887230 | 0.000987 | 0.001731 | 0.000434 | 0.004211 | 0.024817 |
| 55 | 0.044142 | 0.021552 | 0.006000 | 0.903018 | 0.000747 | 0.001292 | 0.000284 | 0.003082 | 0.019883 |
| 60 | 0.066492 | 0.028042 | 0.007868 | 0.863579 | 0.000730 | 0.001512 | 0.000236 | 0.005384 | 0.026158 |
| 65 | 0.099599 | 0.025681 | 0.007120 | 0.835611 | 0.000662 | 0.001416 | 0.000187 | 0.005526 | 0.024199 |
| 70 | 0.158516 | 0.020991 | 0.006402 | 0.786925 | 0.000581 | 0.001242 | 0.000180 | 0.005605 | 0.019559 |
| 75 | 0.249873 | 0.018857 | 0.005739 | 0.701097 | 0.000563 | 0.001147 | 0.000143 | 0.005007 | 0.017574 |
| 80 | 0.360707 | 0.016497 | 0.005010 | 0.596449 | 0.000525 | 0.001006 | 0.000132 | 0.004338 | 0.015335 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

region uzkitatu
**********

| age | death | migration from uzkitatu to rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.067693 | 0.016957 | 0.002879 | 0.000361 | 0.891109 | 0.005121 | 0.000239 | 0.000330 | 0.015310 |
| 5 | 0.003399 | 0.012977 | 0.002091 | 0.000251 | 0.965214 | 0.004050 | 0.000188 | 0.000250 | 0.011580 |
| 10 | 0.002799 | 0.013741 | 0.002154 | 0.000256 | 0.964869 | 0.003450 | 0.000188 | 0.000283 | 0.012260 |
| 15 | 0.004515 | 0.111717 | 0.020902 | 0.003368 | 0.744031 | 0.022153 | 0.003374 | 0.002179 | 0.087761 |
| 20 | 0.007781 | 0.193464 | 0.037009 | 0.006136 | 0.588135 | 0.036765 | 0.005816 | 0.004214 | 0.120681 |
| 25 | 0.012272 | 0.125362 | 0.021454 | 0.003042 | 0.711099 | 0.025476 | 0.003576 | 0.002632 | 0.095086 |
| 30 | 0.009466 | 0.038617 | 0.005754 | 0.000590 | 0.899843 | 0.009319 | 0.000886 | 0.000681 | 0.034844 |
| 35 | 0.020804 | 0.056884 | 0.007543 | 0.000795 | 0.847830 | 0.013362 | 0.001216 | 0.000764 | 0.050803 |
| 40 | 0.020838 | 0.028708 | 0.003143 | 0.000344 | 0.912427 | 0.006746 | 0.000633 | 0.000382 | 0.026780 |
| 45 | 0.042769 | 0.036834 | 0.004528 | 0.000444 | 0.870903 | 0.009056 | 0.000809 | 0.000480 | 0.034176 |
| 50 | 0.052261 | 0.026147 | 0.003350 | 0.000269 | 0.885650 | 0.006939 | 0.000665 | 0.000368 | 0.024351 |
| 55 | 0.050662 | 0.018550 | 0.002357 | 0.000172 | 0.905308 | 0.004754 | 0.000347 | 0.000224 | 0.017624 |
| 60 | 0.076957 | 0.023145 | 0.002993 | 0.000247 | 0.868436 | 0.005270 | 0.000323 | 0.000404 | 0.022225 |
| 65 | 0.113614 | 0.022563 | 0.002859 | 0.000230 | 0.832816 | 0.005315 | 0.000239 | 0.000473 | 0.021891 |
| 70 | 0.154951 | 0.019944 | 0.002783 | 0.000267 | 0.797175 | 0.004882 | 0.000334 | 0.000431 | 0.019233 |
| 75 | 0.244523 | 0.017969 | 0.002492 | 0.000252 | 0.712362 | 0.004400 | 0.000284 | 0.000381 | 0.017337 |
| 80 | 0.353367 | 0.015698 | 0.002195 | 0.000234 | 0.608889 | 0.003895 | 0.000228 | 0.000314 | 0.015179 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

APPENDIX B *Continued.*

region kazakh

| age | death | migration from kazakh to rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.047390 | 0.042311 | 0.009528 | 0.001340 | 0.008541 | 0.862863 | 0.000299 | 0.000710 | 0.027019 |
| 5 | 0.003101 | 0.029820 | 0.006442 | 0.000884 | 0.005970 | 0.934351 | 0.000221 | 0.000499 | 0.018712 |
| 10 | 0.002742 | 0.027494 | 0.005827 | 0.000784 | 0.004005 | 0.941258 | 0.000184 | 0.000490 | 0.017217 |
| 15 | 0.005428 | 0.186505 | 0.043251 | 0.006952 | 0.030071 | 0.611680 | 0.003045 | 0.003202 | 0.109867 |
| 20 | 0.009161 | 0.270538 | 0.060090 | 0.009706 | 0.043381 | 0.464967 | 0.005078 | 0.005159 | 0.131921 |
| 25 | 0.013478 | 0.185524 | 0.038367 | 0.005497 | 0.032360 | 0.612518 | 0.003229 | 0.003369 | 0.105658 |
| 30 | 0.009827 | 0.058131 | 0.011328 | 0.001275 | 0.010732 | 0.869673 | 0.000783 | 0.000867 | 0.037383 |
| 35 | 0.023998 | 0.091795 | 0.015658 | 0.001774 | 0.015614 | 0.790064 | 0.001116 | 0.001066 | 0.058914 |
| 40 | 0.020555 | 0.045022 | 0.006607 | 0.000787 | 0.007853 | 0.888378 | 0.000582 | 0.000540 | 0.029677 |
| 45 | 0.044758 | 0.059377 | 0.009670 | 0.001056 | 0.010717 | 0.833963 | 0.000757 | 0.000663 | 0.039039 |
| 50 | 0.054048 | 0.045001 | 0.007840 | 0.000727 | 0.008307 | 0.853203 | 0.000698 | 0.000571 | 0.029605 |
| 55 | 0.058758 | 0.034801 | 0.005943 | 0.000504 | 0.006135 | 0.869789 | 0.000454 | 0.000384 | 0.023232 |
| 60 | 0.082457 | 0.042662 | 0.007338 | 0.000665 | 0.005841 | 0.831279 | 0.000315 | 0.000631 | 0.028813 |
| 65 | 0.118793 | 0.039795 | 0.006782 | 0.000658 | 0.005488 | 0.800353 | 0.000312 | 0.000668 | 0.027150 |
| 70 | 0.168567 | 0.036601 | 0.006784 | 0.000686 | 0.005384 | 0.756260 | 0.000303 | 0.000713 | 0.024702 |
| 75 | 0.264917 | 0.032803 | 0.006099 | 0.000612 | 0.004851 | 0.667604 | 0.000286 | 0.000630 | 0.022197 |
| 80 | 0.380903 | 0.028586 | 0.005296 | 0.000526 | 0.004277 | 0.560317 | 0.000265 | 0.000536 | 0.019295 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

region grazarm

| age | death | migration from grazarm to rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.042978 | 0.013318 | 0.004039 | 0.000375 | 0.001307 | 0.000899 | 0.929862 | 0.000377 | 0.006846 |
| 5 | 0.002824 | 0.008965 | 0.002624 | 0.000238 | 0.000828 | 0.000607 | 0.979118 | 0.000286 | 0.004511 |
| 10 | 0.002210 | 0.009303 | 0.002629 | 0.000239 | 0.000605 | 0.000507 | 0.979550 | 0.000295 | 0.004663 |
| 15 | 0.003083 | 0.073619 | 0.021100 | 0.002512 | 0.005822 | 0.004025 | 0.851879 | 0.001817 | 0.036143 |
| 20 | 0.005335 | 0.123690 | 0.033231 | 0.004086 | 0.011709 | 0.007612 | 0.759721 | 0.003136 | 0.051481 |
| 25 | 0.007779 | 0.084030 | 0.022034 | 0.002273 | 0.008300 | 0.004752 | 0.828786 | 0.002192 | 0.039854 |
| 30 | 0.005735 | 0.021880 | 0.005661 | 0.000434 | 0.002222 | 0.001202 | 0.950936 | 0.000569 | 0.011361 |
| 35 | 0.012971 | 0.029682 | 0.006713 | 0.000518 | 0.002719 | 0.001641 | 0.929754 | 0.000561 | 0.015440 |
| 40 | 0.014254 | 0.015566 | 0.003022 | 0.000244 | 0.001415 | 0.000813 | 0.956120 | 0.000330 | 0.008235 |
| 45 | 0.033052 | 0.019940 | 0.004327 | 0.000313 | 0.001785 | 0.001101 | 0.928540 | 0.000398 | 0.010543 |
| 50 | 0.047569 | 0.015649 | 0.003553 | 0.000211 | 0.001380 | 0.000923 | 0.922133 | 0.000326 | 0.008257 |
| 55 | 0.042951 | 0.010278 | 0.002376 | 0.000130 | 0.000811 | 0.000558 | 0.937231 | 0.000186 | 0.005478 |
| 60 | 0.072313 | 0.012851 | 0.003036 | 0.000198 | 0.000758 | 0.000644 | 0.902899 | 0.000351 | 0.006950 |
| 65 | 0.108004 | 0.012523 | 0.002881 | 0.000179 | 0.000778 | 0.000628 | 0.867824 | 0.000337 | 0.006846 |
| 70 | 0.163974 | 0.010952 | 0.002784 | 0.000201 | 0.000733 | 0.000615 | 0.814402 | 0.000429 | 0.005911 |
| 75 | 0.258030 | 0.009814 | 0.002469 | 0.000181 | 0.000667 | 0.000529 | 0.722651 | 0.000359 | 0.005300 |
| 80 | 0.371720 | 0.008514 | 0.002200 | 0.000168 | 0.000582 | 0.000490 | 0.611413 | 0.000331 | 0.004581 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

region eslali

| age | death | migration from rsfsr | ukrmol | eslali to belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.023229 | 0.017092 | 0.005216 | 0.002290 | 0.000642 | 0.000794 | 0.000206 | 0.924613 | 0.025918 |
| 5 | 0.001875 | 0.012903 | 0.003776 | 0.001661 | 0.000479 | 0.000580 | 0.000161 | 0.959093 | 0.019472 |
| 10 | 0.001780 | 0.013010 | 0.003706 | 0.001597 | 0.000308 | 0.000468 | 0.000127 | 0.959367 | 0.019636 |
| 15 | 0.004559 | 0.098885 | 0.029282 | 0.011992 | 0.004200 | 0.004498 | 0.002260 | 0.724715 | 0.119606 |
| 20 | 0.007287 | 0.147070 | 0.041065 | 0.014281 | 0.007723 | 0.008209 | 0.003794 | 0.638201 | 0.132370 |
| 25 | 0.008816 | 0.059795 | 0.016129 | 0.005715 | 0.002831 | 0.002840 | 0.001528 | 0.832778 | 0.069568 |
| 30 | 0.010028 | 0.023063 | 0.006051 | 0.002050 | 0.000887 | 0.000914 | 0.000510 | 0.922039 | 0.034458 |
| 35 | 0.015648 | 0.028259 | 0.006454 | 0.002126 | 0.001042 | 0.001152 | 0.000557 | 0.903501 | 0.041261 |
| 40 | 0.019546 | 0.014803 | 0.002927 | 0.001099 | 0.000465 | 0.000539 | 0.000338 | 0.937092 | 0.023192 |
| 45 | 0.033380 | 0.016663 | 0.003686 | 0.001237 | 0.000575 | 0.000636 | 0.000372 | 0.917555 | 0.025897 |
| 50 | 0.052801 | 0.012802 | 0.002998 | 0.000883 | 0.000412 | 0.000503 | 0.000305 | 0.909335 | 0.019961 |
| 55 | 0.047157 | 0.009131 | 0.002153 | 0.000578 | 0.000294 | 0.000344 | 0.000210 | 0.925371 | 0.014762 |
| 60 | 0.068393 | 0.011159 | 0.002602 | 0.000763 | 0.000303 | 0.000373 | 0.000073 | 0.898213 | 0.018122 |
| 65 | 0.110887 | 0.009543 | 0.002236 | 0.000699 | 0.000248 | 0.000330 | 0.000058 | 0.860267 | 0.015732 |
| 70 | 0.178642 | 0.007390 | 0.001851 | 0.000594 | 0.000220 | 0.000251 | 0.000093 | 0.798818 | 0.012140 |
| 75 | 0.279898 | 0.006608 | 0.001656 | 0.000560 | 0.000197 | 0.000244 | 0.000097 | 0.699871 | 0.010870 |
| 80 | 0.400995 | 0.005688 | 0.001392 | 0.000434 | 0.000182 | 0.000182 | 0.000089 | 0.581615 | 0.009424 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

region rural

| age | death | migration from rsfsr | ukrmol | rural to belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.046292 | 0.041498 | 0.015236 | 0.003925 | 0.003455 | 0.004710 | 0.000811 | 0.003056 | 0.881017 |
| 5 | 0.003543 | 0.026898 | 0.009550 | 0.002433 | 0.002199 | 0.003121 | 0.000557 | 0.002058 | 0.949640 |
| 10 | 0.002915 | 0.025878 | 0.008955 | 0.002257 | 0.001536 | 0.002408 | 0.000495 | 0.002126 | 0.953430 |
| 15 | 0.006623 | 0.245256 | 0.083867 | 0.022310 | 0.018500 | 0.020598 | 0.009416 | 0.013134 | 0.580296 |
| 20 | 0.011851 | 0.441021 | 0.137605 | 0.033486 | 0.036041 | 0.039061 | 0.016499 | 0.021010 | 0.263426 |
| 25 | 0.014659 | 0.270460 | 0.083729 | 0.019438 | 0.022440 | 0.023448 | 0.010255 | 0.015128 | 0.540443 |
| 30 | 0.012392 | 0.085522 | 0.026913 | 0.005435 | 0.006957 | 0.007894 | 0.002839 | 0.005318 | 0.846729 |
| 35 | 0.024814 | 0.106016 | 0.028849 | 0.005777 | 0.007971 | 0.009680 | 0.003195 | 0.004757 | 0.808941 |
| 40 | 0.024851 | 0.051281 | 0.012149 | 0.002709 | 0.003841 | 0.004542 | 0.001675 | 0.002629 | 0.896323 |
| 45 | 0.045199 | 0.059758 | 0.015767 | 0.003138 | 0.004606 | 0.005564 | 0.001895 | 0.002761 | 0.861312 |
| 50 | 0.057827 | 0.044146 | 0.012373 | 0.002141 | 0.003445 | 0.004390 | 0.001653 | 0.002360 | 0.871664 |
| 55 | 0.045082 | 0.026667 | 0.007536 | 0.001188 | 0.001992 | 0.002533 | 0.000848 | 0.001330 | 0.912825 |
| 60 | 0.067097 | 0.028943 | 0.008210 | 0.001394 | 0.001678 | 0.002448 | 0.000581 | 0.001999 | 0.887651 |
| 65 | 0.100176 | 0.025356 | 0.007131 | 0.001292 | 0.001487 | 0.002220 | 0.000501 | 0.001929 | 0.859908 |
| 70 | 0.175050 | 0.020148 | 0.006201 | 0.001190 | 0.001267 | 0.001820 | 0.000435 | 0.001831 | 0.792058 |
| 75 | 0.274554 | 0.018020 | 0.005543 | 0.001071 | 0.001141 | 0.001635 | 0.000390 | 0.001635 | 0.696011 |
| 80 | 0.393868 | 0.015622 | 0.004806 | 0.000936 | 0.000999 | 0.001423 | 0.000340 | 0.001417 | 0.580589 |
| 85 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

APPENDIX B *Continued.*

| | | region urban | |
|---|---|---|---|
| | | migration from | |
| age | death | urban to urban | rural |
| 0 | 0.041317 | 0.933201 | 0.025483 |
| 5 | 0.002842 | 0.979588 | 0.017569 |
| 10 | 0.002385 | 0.981267 | 0.016349 |
| 15 | 0.004400 | 0.900614 | 0.094986 |
| 20 | 0.007617 | 0.876668 | 0.115716 |
| 25 | 0.011235 | 0.902674 | 0.086091 |
| 30 | 0.008721 | 0.961037 | 0.030242 |
| 35 | 0.019570 | 0.937377 | 0.043054 |
| 40 | 0.019034 | 0.959040 | 0.021925 |
| 45 | 0.038565 | 0.936154 | 0.025281 |
| 50 | 0.050506 | 0.930345 | 0.019149 |
| 55 | 0.047160 | 0.939995 | 0.012845 |
| 60 | 0.075271 | 0.908364 | 0.016365 |
| 65 | 0.118321 | 0.865570 | 0.016109 |
| 70 | 0.175773 | 0.810323 | 0.013904 |
| 75 | 0.275630 | 0.711926 | 0.012445 |
| 80 | 0.395308 | 0.593898 | 0.010794 |
| 85 | 1.000000 | 0.000000 | 0.000000 |

| | | region rural | |
|---|---|---|---|
| | | migration from | |
| age | death | rural to urban | rural |
| 0 | 0.046371 | 0.072674 | 0.880954 |
| 5 | 0.003544 | 0.046841 | 0.949615 |
| 10 | 0.002915 | 0.043674 | 0.953411 |
| 15 | 0.006627 | 0.413520 | 0.579853 |
| 20 | 0.011846 | 0.725284 | 0.262870 |
| 25 | 0.014616 | 0.445215 | 0.540168 |
| 30 | 0.012385 | 0.140927 | 0.846689 |
| 35 | 0.024790 | 0.166352 | 0.808858 |
| 40 | 0.024841 | 0.078852 | 0.896307 |
| 45 | 0.045176 | 0.093546 | 0.861278 |
| 50 | 0.057821 | 0.070532 | 0.871647 |
| 55 | 0.045070 | 0.042116 | 0.912814 |
| 60 | 0.067096 | 0.045267 | 0.887637 |
| 65 | 0.100174 | 0.039929 | 0.859897 |
| 70 | 0.175050 | 0.032901 | 0.792049 |
| 75 | 0.274554 | 0.029442 | 0.696004 |
| 80 | 0.393869 | 0.025548 | 0.580583 |
| 85 | 1.000000 | 0.000000 | 0.000000 |

Expected number of survivors at exact age $x$ in each region.

age  initial region of cohort  rsfsr

| | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 100000. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 5 | 95769. | 90244. | 1302. | 189. | 362. | 533. | 53. | 186. | 2899. |
| 10 | 95482. | 86749. | 2053. | 298. | 579. | 849. | 90. | 306. | 4559. |
| 15 | 95244. | 83975. | 2665. | 387. | 705. | 1048. | 119. | 417. | 5929. |
| 20 | 94791. | 70349. | 6333. | 1066. | 1671. | 1992. | 493. | 848. | 12039. |
| 25 | 93991. | 60550. | 10285. | 1853. | 2937. | 3091. | 1058. | 1413. | 12805. |
| 30 | 92843. | 55202. | 11832. | 2045. | 3338. | 3221. | 1314. | 1793. | 14099. |
| 35 | 91965. | 53690. | 12067. | 2026. | 3374. | 3230. | 1367. | 1853. | 14357. |
| 40 | 90064. | 51499. | 11894. | 1931. | 3327. | 3126. | 1414. | 1876. | 14998. |
| 45 | 88242. | 50029. | 11651. | 1859. | 3258. | 3045. | 1428. | 1867. | 15106. |
| 50 | 84696. | 47504. | 11335. | 1769. | 3100. | 2864. | 1410. | 1827. | 14886. |
| 55 | 80298. | 44721. | 10851. | 1642. | 2936. | 2692. | 1375. | 1756. | 14325. |
| 60 | 76518. | 42372. | 10422. | 1522. | 2770. | 2486. | 1326. | 1680. | 13939. |
| 65 | 70865. | 38881. | 9672. | 1364. | 2505. | 2216. | 1223. | 1592. | 13413. |
| 70 | 62703. | 33879. | 8549. | 1184. | 2174. | 1911. | 1084. | 1451. | 12471. |
| 75 | 51683. | 27576. | 7056. | 971. | 1805. | 1553. | 901. | 1233. | 10587. |
| 80 | 37441. | 19698. | 5106. | 710. | 1339. | 1117. | 665. | 917. | 7888. |
| 85 | 22648. | 11718. | 3075. | 442. | 849. | 676. | 415. | 568. | 4904. |

age  initial region of cohort  ukrmol

| | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 0. | 100000. | 0. | 0. | 0. | 0. | 0. | 0. |
| 5 | 97164. | 2802. | 91023. | 167. | 134. | 248. | 41. | 132. | 2617. |
| 10 | 96922. | 4579. | 86920. | 270. | 226. | 414. | 71. | 225. | 4218. |
| 15 | 96719. | 6185. | 83319. | 360. | 286. | 531. | 96. | 317. | 5625. |
| 20 | 96334. | 17015. | 62454. | 1079. | 909. | 1254. | 443. | 731. | 12448. |
| 25 | 95609. | 31062. | 42409. | 1916. | 2081. | 2387. | 1014. | 1319. | 13420. |
| 30 | 94570. | 34380. | 35838. | 2090. | 2522. | 2599. | 1261. | 1688. | 14192. |
| 35 | 93722. | 34895. | 34018. | 2067. | 2591. | 2642. | 1315. | 1753. | 14442. |
| 40 | 91835. | 35435. | 30874. | 1971. | 2612. | 2611. | 1366. | 1784. | 15181. |
| 45 | 90044. | 35256. | 29270. | 1898. | 2583. | 2566. | 1382. | 1780. | 15308. |
| 50 | 86542. | 34344. | 27293. | 1805. | 2486. | 2437. | 1367. | 1746. | 15063. |
| 55 | 82087. | 32930. | 25287. | 1675. | 2374. | 2308. | 1335. | 1682. | 14495. |
| 60 | 78290. | 31547. | 23799. | 1553. | 2251. | 2142. | 1289. | 1610. | 14100. |
| 65 | 72521. | 29339. | 21540. | 1390. | 2045. | 1919. | 1190. | 1529. | 13568. |
| 70 | 64194. | 25893. | 18583. | 1208. | 1783. | 1663. | 1055. | 1396. | 12613. |
| 75 | 52890. | 21312. | 14974. | 990. | 1487. | 1358. | 878. | 1189. | 10703. |
| 80 | 38291. | 15392. | 10580. | 724. | 1108. | 981. | 648. | 886. | 7971. |
| 85 | 23137. | 9259. | 6218. | 450. | 706. | 597. | 405. | 549. | 4954. |

APPENDIX B *Continued.*

age initial region of cohort belssr

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 0. | 0. | 100000. | 0. | 0. | 0. | 0. | 0. |
| 5 | 97515. | 3060. | 1109. | 89685. | 120. | 222. | 22. | 611. | 2686. |
| 10 | 97345. | 5013. | 1803. | 84543. | 207. | 375. | 40. | 1013. | 4351. |
| 15 | 97164. | 6766. | 2406. | 79984. | 263. | 484. | 57. | 1393. | 5813. |
| 20 | 96833. | 17732. | 6081. | 55781. | 849. | 1150. | 331. | 2489. | 12421. |
| 25 | 96174. | 31177. | 10052. | 33710. | 1965. | 2228. | 834. | 3167. | 13040. |
| 30 | 95136. | 34652. | 11558. | 25240. | 2418. | 2477. | 1075. | 3582. | 14134. |
| 35 | 94308. | 35255. | 11830. | 22968. | 2495. | 2532. | 1129. | 3612. | 14486. |
| 40 | 92482. | 35889. | 11736. | 19732. | 2528. | 2520. | 1183. | 3577. | 15316. |
| 45 | 90681. | 35792. | 11533. | 18112. | 2508. | 2487. | 1203. | 3522. | 15524. |
| 50 | 87262. | 34963. | 11259. | 16281. | 2422. | 2374. | 1198. | 3403. | 15362. |
| 55 | 82806. | 33619. | 10816. | 14511. | 2321. | 2260. | 1176. | 3240. | 14863. |
| 60 | 78961. | 32310. | 10425. | 13140. | 2207. | 2106. | 1139. | 3086. | 14548. |
| 65 | 73249. | 30168. | 9717. | 11393. | 2011. | 1896. | 1054. | 2910. | 14099. |
| 70 | 65031. | 26705. | 8619. | 9562. | 1758. | 1650. | 937. | 2632. | 13168. |
| 75 | 53746. | 22027. | 7133. | 7562. | 1469. | 1352. | 781. | 2217. | 11204. |
| 80 | 39104. | 15942. | 5176. | 5329. | 1097. | 980. | 578. | 1635. | 8366. |
| 85 | 23811. | 9611. | 3126. | 3196. | 701. | 599. | 362. | 1003. | 5213. |

age initial region of cohort uzkitatu

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 0. | 0. | 0. | 100000. | 0. | 0. | 0. | 0. |
| 5 | 93231. | 1696. | 288. | 36. | 89111. | 512. | 24. | 33. | 1531. |
| 10 | 92915. | 2848. | 494. | 63. | 86022. | 851. | 42. | 60. | 2535. |
| 15 | 92656. | 4033. | 708. | 92. | 83012. | 1112. | 60. | 92. | 3547. |
| 20 | 92229. | 13739. | 2794. | 467. | 61915. | 2657. | 386. | 324. | 9947. |
| 25 | 91469. | 28109. | 6483. | 1189. | 37193. | 4248. | 932. | 825. | 12490. |
| 30 | 90340. | 32669. | 8280. | 1453. | 27281. | 4302. | 1186. | 1188. | 13980. |
| 35 | 89473. | 33434. | 8654. | 1469. | 24836. | 4279. | 1239. | 1267. | 14294. |
| 40 | 87598. | 34220. | 8774. | 1434. | 21430. | 4099. | 1290. | 1319. | 15032. |
| 45 | 85796. | 34177. | 8692. | 1396. | 19738. | 3975. | 1306. | 1332. | 15180. |
| 50 | 82279. | 33530. | 8590. | 1347. | 17414. | 3724. | 1296. | 1324. | 15055. |
| 55 | 77975. | 32260. | 8317. | 1262. | 15587. | 3480. | 1267. | 1289. | 14513. |
| 60 | 74249. | 30991. | 8047. | 1176. | 14210. | 3206. | 1224. | 1242. | 14152. |
| 65 | 68742. | 28905. | 7533. | 1061. | 12429. | 2849. | 1131. | 1190. | 13644. |
| 70 | 60894. | 25575. | 6713. | 929. | 10429. | 2447. | 1003. | 1098. | 12701. |
| 75 | 50386. | 21101. | 5584. | 768. | 8378. | 1982. | 835. | 944. | 10794. |
| 80 | 36732. | 15277. | 4073. | 566. | 6016. | 1419. | 617. | 710. | 8052. |
| 85 | 22439. | 9215. | 2474. | 355. | 3693. | 857. | 386. | 444. | 5014. |

age initial region of cohort kazakh
### ##################################

| | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 0. | 0. | 0. | 0. | 100000. | 0. | 0. | 0. |
| 5 | 95261. | 4231. | 953. | 134. | 854. | 86286. | 30. | 71. | 2702. |
| 10 | 94966. | 6741. | 1531. | 216. | 1357. | 80651. | 52. | 124. | 4294. |
| 15 | 94707. | 8892. | 2030. | 286. | 1650. | 75949. | 71. | 179. | 5650. |
| 20 | 94199. | 23269. | 5713. | 943. | 3735. | 46756. | 392. | 512. | 12879. |
| 25 | 93353. | 37901. | 9850. | 1769. | 5214. | 22983. | 947. | 1091. | 13598. |
| 30 | 92189. | 40845. | 11458. | 1981. | 5322. | 15157. | 1208. | 1482. | 14737. |
| 35 | 91308. | 41058. | 11713. | 1967. | 5236. | 13567. | 1263. | 1557. | 14947. |
| 40 | 89377. | 41128. | 11593. | 1881. | 5008. | 11242. | 1316. | 1600. | 15609. |
| 45 | 87558. | 40664. | 11372. | 1814. | 4832. | 10238. | 1333. | 1605. | 15701. |
| 50 | 83999. | 39419. | 11092. | 1731. | 4524. | 8845. | 1322. | 1584. | 15483. |
| 55 | 79612. | 37632. | 10637. | 1608. | 4231. | 7783. | 1293. | 1533. | 14895. |
| 60 | 75806. | 35981. | 10231. | 1493. | 3965. | 6909. | 1250. | 1472. | 14506. |
| 65 | 70178. | 33365. | 9508. | 1339. | 3561. | 5887. | 1154. | 1404. | 13961. |
| 70 | 62121. | 29349. | 8414. | 1164. | 3067. | 4844. | 1024. | 1287. | 12972. |
| 75 | 51252. | 24090. | 6951. | 956. | 2528. | 3768. | 853. | 1101. | 11007. |
| 80 | 37186. | 17348. | 5035. | 700. | 1862. | 2593. | 630. | 824. | 8196. |
| 85 | 22547. | 10403. | 3035. | 436. | 1172. | 1502. | 394. | 513. | 5092. |

age initial region of cohort grazarm
### ##################################

| | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 0. | 0. | 0. | 0. | 0. | 100000. | 0. | 0. |
| 5 | 95702. | 1332. | 404. | 38. | 131. | 90. | 92986. | 38. | 685. |
| 10 | 95431. | 2144. | 649. | 61. | 209. | 149. | 91046. | 66. | 1108. |
| 15 | 95219. | 2967. | 889. | 85. | 263. | 196. | 89185. | 97. | 1537. |
| 20 | 94914. | 9550. | 2822. | 350. | 790. | 567. | 76006. | 275. | 4555. |
| 25 | 94343. | 19526. | 5617. | 811. | 1762. | 1302. | 57901. | 615. | 6809. |
| 30 | 93449. | 23791. | 7150. | 1015. | 2219. | 1602. | 48168. | 893. | 8612. |
| 35 | 92740. | 24512. | 7444. | 1032. | 2285. | 1667. | 45866. | 955. | 8979. |
| 40 | 91166. | 25275. | 7513. | 1015. | 2301. | 1694. | 42720. | 996. | 9653. |
| 45 | 89568. | 25393. | 7441. | 992. | 2280. | 1689. | 40888. | 1008. | 9877. |
| 50 | 86253. | 25116. | 7361. | 963. | 2204. | 1638. | 38015. | 1007. | 9949. |
| 55 | 81928. | 24367. | 7143. | 906. | 2113. | 1578. | 35099. | 984. | 9737. |
| 60 | 78218. | 23521. | 6921. | 847. | 2007. | 1479. | 32919. | 950. | 9574. |
| 65 | 72499. | 22082. | 6497. | 768. | 1827. | 1342. | 29739. | 915. | 9330. |
| 70 | 64381. | 19676. | 5806. | 675. | 1597. | 1177. | 25822. | 848. | 8780. |
| 75 | 53368. | 16342. | 4846. | 562. | 1336. | 973. | 21041. | 735. | 7534. |
| 80 | 39029. | 11911. | 3546. | 417. | 999. | 712. | 15214. | 556. | 5673. |
| 85 | 23961. | 7235. | 2162. | 263. | 639. | 439. | 9308. | 351. | 3565. |

APPENDIX B *Continued.*

age initial region of cohort eslali

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 0. | 0. | 0. | 0. | 0. | 0. | 100000. | 0. |
| 5 | 97677. | 1709. | 522. | 229. | 64. | 79. | 21. | 92461. | 2592. |
| 10 | 97487. | 2922. | 889. | 378. | 117. | 144. | 37. | 88688. | 4311. |
| 15 | 97306. | 4118. | 1244. | 513. | 153. | 197. | 51. | 85100. | 5929. |
| 20 | 96852. | 13492. | 4130. | 1552. | 646. | 702. | 314. | 61789. | 14228. |
| 25 | 96075. | 26916. | 8100. | 2468. | 1722. | 1785. | 825. | 39902. | 14357. |
| 30 | 95035. | 29933. | 9472. | 2530. | 2131. | 2048. | 1045. | 33677. | 14199. |
| 35 | 94110. | 30613. | 9767. | 2491. | 2204. | 2108. | 1097. | 31209. | 14622. |
| 40 | 92306. | 31164. | 9723. | 2345. | 2232. | 2109. | 1144. | 28357. | 15232. |
| 45 | 90444. | 31106. | 9574. | 2249. | 2213. | 2086. | 1161. | 26663. | 15392. |
| 50 | 86982. | 30437. | 9376. | 2129. | 2139. | 1999. | 1154. | 24559. | 15188. |
| 55 | 82425. | 29285. | 9026. | 1970. | 2050. | 1908. | 1130. | 22412. | 14645. |
| 60 | 78562. | 28133. | 8703. | 1824. | 1949. | 1778. | 1094. | 20786. | 14294. |
| 65 | 72904. | 26242. | 8113. | 1630. | 1775. | 1601. | 1010. | 18741. | 13791. |
| 70 | 64662. | 23205. | 7197. | 1412. | 1551. | 1394. | 896. | 16192. | 12817. |
| 75 | 53267. | 19122. | 5956. | 1153. | 1296. | 1142. | 746. | 12997. | 10855. |
| 80 | 38551. | 13828. | 4323. | 840. | 968. | 828. | 551. | 9143. | 8070. |
| 85 | 23284. | 8330. | 2611. | 520. | 618. | 505. | 345. | 5347. | 5007. |

age initial region of cohort rural

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100000. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 100000. |
| 5 | 95371. | 4150. | 1524. | 392. | 346. | 471. | 81. | 306. | 88102. |
| 10 | 95038. | 6415. | 2339. | 592. | 542. | 736. | 131. | 483. | 83800. |
| 15 | 94768. | 8455. | 3050. | 760. | 667. | 917. | 173. | 656. | 80090. |
| 20 | 94173. | 27309. | 9463. | 2419. | 2131. | 2381. | 952. | 1604. | 47915. |
| 25 | 93254. | 45288. | 14709. | 3473. | 3756. | 3832. | 1771. | 2376. | 18048. |
| 30 | 92135. | 45170. | 15263. | 3284. | 3908. | 3652. | 1921. | 2639. | 16299. |
| 35 | 91269. | 44723. | 15213. | 3151. | 3878. | 3594. | 1945. | 2642. | 16123. |
| 40 | 89394. | 43873. | 14613. | 2892. | 3742. | 3398. | 1951. | 2595. | 16331. |
| 45 | 87595. | 43027. | 14173. | 2738. | 3630. | 3280. | 1940. | 2544. | 16262. |
| 50 | 84106. | 41291. | 13617. | 2556. | 3418. | 3051. | 1886. | 2450. | 15837. |
| 55 | 79740. | 39164. | 12912. | 2340. | 3212. | 2845. | 1812. | 2325. | 15129. |
| 60 | 76000. | 37279. | 12331. | 2153. | 3017. | 2616. | 1736. | 2207. | 14662. |
| 65 | 70405. | 34395. | 11363. | 1908. | 2717. | 2320. | 1593. | 2068. | 14041. |
| 70 | 62339. | 30123. | 9975. | 1640. | 2348. | 1990. | 1404. | 1861. | 12997. |
| 75 | 51402. | 24629. | 8178. | 1329. | 1942. | 1610. | 1162. | 1562. | 10991. |
| 80 | 37260. | 17670. | 5879. | 961. | 1435. | 1152. | 853. | 1148. | 8160. |
| 85 | 22559. | 10559. | 3517. | 592. | 906. | 695. | 530. | 703. | 5057. |

| age | initial region of cohort urban | | | age | initial region of cohort rural | | |
|---|---|---|---|---|---|---|---|
| | total | urban | rural | | total | urban | rural |
| 0 | 100000. | 100000. | 0. | 0 | 100000. | 0. | 100000. |
| 5 | 95868. | 93320. | 2548. | 5 | 95363. | 7267. | 88095. |
| 10 | 95594. | 91535. | 4059. | 10 | 95030. | 11246. | 83784. |
| 15 | 95364. | 89997. | 5367. | 15 | 94759. | 14694. | 80065. |
| 20 | 94932. | 83272. | 11660. | 20 | 94164. | 46342. | 47822. |
| 25 | 94160. | 81459. | 12701. | 25 | 93244. | 75311. | 17933. |
| 30 | 93059. | 79186. | 13874. | 30 | 92136. | 75965. | 16171. |
| 35 | 92197. | 78055. | 14141. | 35 | 91273. | 75284. | 15989. |
| 40 | 90319. | 75520. | 14799. | 40 | 89404. | 73230. | 16174. |
| 45 | 88514. | 73593. | 14920. | 45 | 87608. | 71505. | 16102. |
| 50 | 85001. | 70291. | 14711. | 50 | 84123. | 68446. | 15676. |
| 55 | 80601. | 66432. | 14169. | 55 | 79759. | 64785. | 14975. |
| 60 | 76829. | 63043. | 13787. | 60 | 76029. | 61528. | 14502. |
| 65 | 71159. | 57890. | 13269. | 65 | 70425. | 56546. | 13879. |
| 70 | 62980. | 50637. | 12343. | 70 | 62344. | 49499. | 12845. |
| 75 | 51919. | 41439. | 10480. | 75 | 51395. | 40533. | 10862. |
| 80 | 37620. | 29810. | 7810. | 80 | 37241. | 29176. | 8065. |
| 85 | 22760. | 17904. | 4856. | 85 | 22531. | 17534. | 4997. |

*Appendix C*

# MULTIREGIONAL POPULATION PROJECTIONS, TOTAL POPULATION, 1984–2024

# APPENDIX C

## Multiregional population projections.

year 1984

population

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 26022748. | 9412168. | 3208353. | 647610. | 1661248. | 992192. | 941190. | 458760. | 8705230. |
| 5 | 23103058. | 7875500. | 2761995. | 531486. | 1308891. | 850767. | 772939. | 411025. | 8590850. |
| 10 | 19365608. | 5687997. | 2113228. | 372539. | 983297. | 646311. | 616688. | 355453. | 8632095. |
| 15 | 22676256. | 7493298. | 2621190. | 493813. | 1047567. | 754643. | 735898. | 404700. | 9125155. |
| 20 | 24623928. | 10799499. | 3556501. | 723951. | 1147662. | 955314. | 788958. | 527088. | 6124960. |
| 25 | 21839172. | 10920758. | 3523758. | 688593. | 1046297. | 892510. | 716043. | 532854. | 3518368. |
| 30 | 18578686. | 9229941. | 3011607. | 561498. | 848363. | 751724. | 599171. | 484907. | 3091475. |
| 35 | 12066972. | 5348869. | 1934694. | 324181. | 477107. | 440714. | 338056. | 362922. | 2844429. |
| 40 | 20408752. | 8720738. | 2898557. | 455809. | 722405. | 712097. | 613368. | 416779. | 5869003. |
| 45 | 15581711. | 6497108. | 1957341. | 310838. | 508685. | 474307. | 474646. | 346471. | 5012315. |
| 50 | 17767966. | 7217122. | 2274732. | 327135. | 548138. | 534414. | 493725. | 352411. | 6020289. |
| 55 | 12443269. | 4989101. | 1716927. | 232301. | 348211. | 329639. | 315166. | 252152. | 4259772. |
| 60 | 8027018. | 3157514. | 1063420. | 130741. | 228127. | 202738. | 189839. | 154746. | 2899892. |
| 65 | 9968062. | 3785465. | 1286326. | 132277. | 247855. | 207833. | 221842. | 174650. | 3911814. |
| 70 | 10418235. | 3708498. | 1240969. | 129511. | 247659. | 211623. | 219289. | 183090. | 4477595. |
| 75 | 6721859. | 2246228. | 772304. | 87162. | 158170. | 137925. | 137338. | 127071. | 3055663. |
| 80 | 4010212. | 1278485. | 450102. | 54805. | 94053. | 77524. | 80370. | 80798. | 1898076. |
| 85 | 2648277. | 848309. | 295350. | 40599. | 71301. | 54170. | 57043. | 54744. | 1230760. |
| total | 276271776. | 109168584. | 36683356. | 6244849. | 11694631. | 9226444. | 8309566. | 5680618. | 89263736. |

percentage distribution

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 9.4193 | 8.6217 | 8.7352 | 10.3703 | 14.2052 | 10.7538 | 11.3266 | 8.0759 | 9.7523 |
| 5 | 8.3624 | 7.2141 | 7.5293 | 8.5108 | 11.1888 | 9.2210 | 9.3018 | 7.2356 | 9.6241 |
| 10 | 7.0096 | 5.1736 | 5.7607 | 5.9655 | 8.4081 | 7.0050 | 7.3974 | 6.2573 | 9.6703 |
| 15 | 8.2080 | 6.8640 | 7.1454 | 7.9075 | 8.9577 | 8.1791 | 8.8560 | 7.1242 | 10.2227 |
| 20 | 8.9129 | 9.8925 | 9.6951 | 11.5928 | 9.8136 | 10.3541 | 9.4946 | 9.2786 | 6.8616 |
| 25 | 7.9050 | 10.0036 | 9.6059 | 11.0266 | 8.9468 | 9.6738 | 8.6171 | 9.3802 | 3.9415 |
| 30 | 6.7248 | 8.4548 | 8.2097 | 8.9914 | 7.2543 | 8.1475 | 7.2106 | 8.5362 | 3.4633 |
| 35 | 4.3678 | 4.8960 | 5.2740 | 5.1912 | 4.0797 | 4.7766 | 4.0683 | 6.3888 | 3.1865 |
| 40 | 7.3872 | 7.9883 | 7.9016 | 7.2990 | 6.1772 | 7.7180 | 7.3815 | 7.3369 | 6.5749 |
| 45 | 5.6400 | 5.9514 | 5.3358 | 4.9775 | 4.3897 | 5.1407 | 5.7120 | 6.0992 | 5.6152 |
| 50 | 6.4313 | 6.6110 | 6.2010 | 5.2385 | 4.6871 | 5.7922 | 5.9416 | 6.2037 | 6.7444 |
| 55 | 4.5040 | 4.5701 | 4.6804 | 3.7199 | 2.9775 | 3.5728 | 3.7928 | 4.4388 | 4.7721 |
| 60 | 2.9055 | 2.8923 | 2.8989 | 2.0936 | 1.9507 | 2.1974 | 2.2846 | 2.7241 | 3.2487 |
| 65 | 3.6081 | 3.4675 | 3.5066 | 2.1182 | 2.1194 | 2.2526 | 2.6697 | 3.0745 | 4.3823 |
| 70 | 3.7710 | 3.3970 | 3.3829 | 2.0739 | 2.1177 | 2.2937 | 2.6390 | 3.2231 | 5.0161 |
| 75 | 2.4331 | 2.0576 | 2.1053 | 1.3957 | 1.3525 | 1.4949 | 1.6528 | 2.2369 | 3.4232 |
| 80 | 1.4515 | 1.1711 | 1.2270 | 0.8776 | 0.8042 | 0.8402 | 0.9672 | 1.4223 | 2.1219 |
| 85 | 0.9586 | 0.7734 | 0.8051 | 0.6501 | 0.6097 | 0.5871 | 0.6865 | 0.9637 | 1.3788 |
| total | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 33.8701 | 34.3343 | 34.0417 | 30.5086 | 27.6634 | 30.4359 | 30.8036 | 34.3002 | 34.8932 |
| aha | 100.0000 | 39.5149 | 13.2780 | 2.2604 | 4.2330 | 3.3396 | 3.0078 | 2.0562 | 32.3101 |
| lam | 1.048879 | 1.106401 | 1.108324 | 1.156978 | 1.153635 | 1.113342 | 1.095609 | 1.133273 | 0.937544 |
| r | 0.009544 | 0.020222 | 0.020570 | 0.029162 | 0.028583 | 0.021473 | 0.018262 | 0.025022 | -0.012898 |

year 1994

population

| age | total | rsfsr | ukrnoi | belasr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 26618682. | 9816194. | 3441557. | 717781. | 1959595. | 1062159. | 1036803. | 526863. | 8057728. |
| 5 | 26517548. | 9746158. | 3447000. | 705981. | 1797001. | 1047841. | 986946. | 528002. | 8258625. |
| 10 | 25339250. | 9247006. | 3249684. | 645169. | 1592481. | 989239. | 900506. | 495424. | 8219781. |
| 15 | 22948010. | 8648097. | 3035731. | 597983. | 1278644. | 864457. | 769120. | 467391. | 7286588. |
| 20 | 19151118. | 8310769. | 2862925. | 579472. | 1003523. | 753069. | 645929. | 459718. | 4535714. |
| 25 | 22278688. | 10871816. | 3630085. | 726173. | 1126864. | 915060. | 762311. | 583614. | 3662764. |
| 30 | 24108404. | 11822641. | 3995565. | 761288. | 1162559. | 961867. | 780104. | 655150. | 3969230. |
| 35 | 21286240. | 10535343. | 3480222. | 628557. | 990479. | 825702. | 688842. | 563540. | 3573553. |
| 40 | 17931274. | 8880172. | 2849278. | 499048. | 791870. | 687853. | 577387. | 476373. | 3169292. |
| 45 | 11462742. | 5211173. | 1819168. | 293634. | 448165. | 406319. | 326161. | 346639. | 2611484. |
| 50 | 18868208. | 8328629. | 2736684. | 416387. | 672040. | 644963. | 573888. | 407230. | 5088387. |
| 55 | 14113881. | 6084315. | 1846277. | 278543. | 468413. | 429225. | 434841. | 326518. | 4245749. |
| 60 | 15880548. | 6610329. | 2089482. | 284155. | 490866. | 463211. | 442967. | 329498. | 5170040. |
| 65 | 10635212. | 4319520. | 1478656. | 191010. | 293254. | 271880. | 266365. | 228403. | 3586123. |
| 70 | 6260204. | 2478065. | 832945. | 100973. | 175957. | 154891. | 146699. | 131154. | 2239520. |
| 75 | 6669591. | 2551829. | 867353. | 92358. | 171910. | 143063. | 149779. | 129847. | 2563451. |
| 80 | 5477894. | 1977925. | 662563. | 74039. | 141099. | 116605. | 118984. | 107243. | 2279437. |
| 85 | 4081711. | 1388831. | 473960. | 64150. | 119170. | 91876. | 92509. | 87057. | 1764160. |
| total | 299629216. | 126828824. | 42799132. | 7656701. | 14683848. | 10829279. | 9700143. | 6849665. | 80281624. |

percentage distribution

| age | total | rsfsr | ukrnoi | belasr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 8.8839 | 7.7397 | 8.0412 | 9.3745 | 13.3452 | 9.8082 | 10.6885 | 7.6918 | 10.0368 |
| 5 | 8.8501 | 7.6845 | 8.0539 | 9.2204 | 12.2379 | 9.6760 | 10.1746 | 7.7084 | 10.2871 |
| 10 | 8.4569 | 7.2909 | 7.5929 | 8.4262 | 10.8448 | 9.1349 | 9.2834 | 7.2328 | 10.2387 |
| 15 | 7.6588 | 6.8187 | 7.0930 | 7.8099 | 8.7078 | 7.9826 | 7.9290 | 6.8236 | 9.0763 |
| 20 | 6.3916 | 6.5527 | 6.6892 | 7.5682 | 6.8342 | 6.9540 | 6.6590 | 6.7115 | 5.6498 |
| 25 | 7.4354 | 8.5720 | 8.4817 | 9.4842 | 7.6742 | 8.4499 | 7.8588 | 8.5203 | 4.5624 |
| 30 | 8.0461 | 9.3217 | 9.3356 | 9.9428 | 7.9173 | 8.8821 | 8.0422 | 9.5647 | 4.9441 |
| 35 | 7.1042 | 8.3067 | 8.1315 | 8.2092 | 6.7454 | 7.6247 | 7.1014 | 8.2273 | 4.4513 |
| 40 | 5.9845 | 7.0017 | 6.6573 | 6.5178 | 5.3928 | 6.3518 | 5.9524 | 6.9547 | 3.9477 |
| 45 | 3.8256 | 4.1088 | 4.2505 | 3.8350 | 3.0521 | 3.7520 | 3.3624 | 5.0607 | 3.2529 |
| 50 | 6.2972 | 6.5668 | 6.3942 | 5.4382 | 4.5767 | 5.9557 | 5.9163 | 5.9452 | 6.3382 |
| 55 | 4.7104 | 4.7973 | 4.3138 | 3.6379 | 3.1900 | 3.9636 | 4.4828 | 4.7669 | 5.2886 |
| 60 | 5.3001 | 5.2120 | 4.8821 | 3.7112 | 3.3429 | 4.2774 | 4.5666 | 4.8104 | 6.4399 |
| 65 | 3.5495 | 3.4058 | 3.4549 | 2.4947 | 1.9971 | 2.5106 | 2.7460 | 3.3345 | 4.4669 |
| 70 | 2.0893 | 1.9539 | 1.9462 | 1.3187 | 1.1983 | 1.4303 | 1.5123 | 1.9148 | 2.7896 |
| 75 | 2.2259 | 2.0120 | 2.0266 | 1.2062 | 1.1707 | 1.3211 | 1.5441 | 1.8957 | 3.1931 |
| 80 | 1.8282 | 1.5595 | 1.5481 | 0.9670 | 0.9609 | 1.0768 | 1.2266 | 1.5657 | 2.8393 |
| 85 | 1.3623 | 1.0950 | 1.1074 | 0.8378 | 0.8116 | 0.8484 | 0.9537 | 1.2710 | 2.1975 |
| total | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 34.0688 | 34.7612 | 34.2132 | 30.9305 | 27.5767 | 31.0911 | 31.1723 | 34.6558 | 35.0863 |
| sha | 100.0000 | 42.3286 | 14.2840 | 2.5554 | 4.9007 | 3.6142 | 3.2374 | 2.2860 | 26.7937 |
| lam | 1.037333 | 1.066664 | 1.069134 | 1.089850 | 1.107770 | 1.071542 | 1.073192 | 1.085698 | 0.953724 |
| r | 0.007331 | 0.012907 | 0.013370 | 0.017208 | 0.020470 | 0.013820 | 0.014128 | 0.016445 | -0.009476 |

APPENDIX C *Continued.*

year 2004

population

| age | total | rsfsr | ukrmol | belasr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 27481164. | 10241120. | 3648021. | 758167. | 2190923. | 1113736. | 1092680. | 558099. | 7846417. |
| 5 | 25555388. | 9852294. | 3435197. | 702935. | 1940242. | 1041710. | 993023. | 548907. | 7445079. |
| 10 | 25920768. | 9600710. | 3459387. | 704833. | 1859719. | 1050558. | 989712. | 556633. | 7699219. |
| 15 | 26382658. | 10366487. | 3661982. | 746277. | 1703060. | 1038313. | 967276. | 573913. | 7285352. |
| 20 | 25069000. | 11376712. | 3844450. | 786854. | 1455819. | 1017208. | 892761. | 589077. | 5106519. |
| 25 | 22558198. | 11045074. | 3703863. | 735793. | 1203621. | 929818. | 767979. | 594841. | 3573608. |
| 30 | 18751860. | 9096838. | 3135555. | 595017. | 952308. | 747977. | 626888. | 536372. | 3061349. |
| 35 | 21715060. | 10570778. | 3576543. | 658576. | 1050628. | 845222. | 729320. | 607248. | 3676748. |
| 40 | 23269418. | 11398337. | 3765054. | 672456. | 1073472. | 882979. | 751327. | 639773. | 4086022. |
| 45 | 20233508. | 9992911. | 3240256. | 555973. | 901731. | 746687. | 654190. | 540987. | 3600768. |
| 50 | 16600725. | 8204913. | 2629286. | 438023. | 706685. | 605328. | 534008. | 445396. | 3037090. |
| 55 | 10393639. | 4782200. | 1659864. | 253656. | 399329. | 353668. | 298351. | 314438. | 2332133. |
| 60 | 16862070. | 7529024. | 2475423. | 353856. | 590623. | 546116. | 511481. | 375149. | 4480398. |
| 65 | 12053467. | 5219916. | 1594193. | 227069. | 387987. | 346561. | 364882. | 290508. | 3622355. |
| 70 | 12375328. | 5150954. | 1635421. | 216615. | 375640. | 345702. | 340329. | 275682. | 4034986. |
| 75 | 7113020. | 2887630. | 988772. | 128265. | 201185. | 180382. | 178958. | 164368. | 2383459. |
| 80 | 3292005. | 1304614. | 439138. | 55504. | 98510. | 82398. | 79200. | 74433. | 1158208. |
| 85 | 1046184. | 1540335. | 521823. | 66512. | 127603. | 94167. | 100236. | 87676. | 1507831. |
| total | 319589472. | 139760848. | 47413828. | 8652383. | 17218688. | 11968521. | 10872157. | 7765492. | 75937536. |

percentage distribution

| age | total | rsfsr | ukrmol | belasr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 8.5864 | 7.3276 | 7.6940 | 8.7163 | 12.7241 | 9.3055 | 10.0503 | 7.1354 | 10.3327 |
| 5 | 7.9963 | 6.7632 | 7.2451 | 8.1242 | 11.2682 | 8.7037 | 9.1336 | 7.0170 | 9.8042 |
| 10 | 8.1106 | 6.8694 | 7.2962 | 8.1461 | 10.8006 | 8.7776 | 9.1032 | 7.1680 | 10.1389 |
| 15 | 8.2427 | 7.4173 | 7.7234 | 8.6251 | 9.8908 | 8.6754 | 8.8968 | 7.3906 | 9.5939 |
| 20 | 7.8441 | 8.1401 | 8.1083 | 9.0941 | 8.4526 | 8.4990 | 8.2114 | 7.5858 | 6.7246 |
| 25 | 7.0572 | 7.9028 | 7.8109 | 8.5039 | 6.9902 | 7.7689 | 7.0637 | 7.6601 | 4.7060 |
| 30 | 5.8675 | 6.5089 | 6.6132 | 6.8769 | 5.5307 | 6.2495 | 5.7619 | 6.9071 | 4.0314 |
| 35 | 6.7947 | 7.5635 | 7.5432 | 7.6115 | 6.1017 | 7.0620 | 6.7081 | 7.8198 | 4.8418 |
| 40 | 7.2810 | 8.1556 | 7.9408 | 7.7719 | 6.2343 | 7.3775 | 6.9106 | 8.2387 | 5.3808 |
| 45 | 6.3311 | 7.1500 | 6.8340 | 6.4257 | 5.2369 | 6.2388 | 6.0171 | 6.9666 | 4.7417 |
| 50 | 5.1948 | 5.8707 | 5.5454 | 5.0625 | 4.1042 | 5.0576 | 4.9117 | 5.7356 | 3.9995 |
| 55 | 3.2522 | 3.4217 | 3.5008 | 2.9316 | 2.3192 | 2.9550 | 2.7442 | 4.0492 | 3.0711 |
| 60 | 5.2762 | 5.3871 | 5.2209 | 4.0897 | 3.4301 | 4.5629 | 4.7045 | 4.8310 | 5.9001 |
| 65 | 3.7715 | 3.7349 | 3.3623 | 2.6244 | 2.2533 | 2.8956 | 3.3561 | 3.7410 | 4.7702 |
| 70 | 3.8723 | 3.6855 | 3.4492 | 2.5035 | 2.1816 | 2.8884 | 3.1303 | 3.5501 | 5.3136 |
| 75 | 2.2257 | 2.0661 | 2.0854 | 1.4824 | 1.1684 | 1.5071 | 1.6460 | 2.1167 | 3.1387 |
| 80 | 1.0301 | 0.9335 | 0.9262 | 0.6415 | 0.5721 | 0.6885 | 0.7285 | 0.9585 | 1.5252 |
| 85 | 1.2661 | 1.1021 | 1.1006 | 0.7687 | 0.7411 | 0.7868 | 0.9220 | 1.1290 | 1.9856 |
| total | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 34.4633 | 35.6113 | 38.8716 | 32.0210 | 28.0516 | 32.0070 | 31.9196 | 35.5720 | 38.4658 |
| sha | 100.0000 | 43.7314 | 14.8359 | 2.7073 | 5.3878 | 3.7450 | 3.4019 | 2.4298 | 23.7610 |
| lam | 1.032160 | 1.046592 | 1.049345 | 1.057968 | 1.077618 | 1.047576 | 1.055943 | 1.059763 | 0.977278 |
| r | 0.006331 | 0.009108 | 0.009633 | 0.011270 | 0.014951 | 0.009296 | 0.010887 | 0.011609 | -0.004597 |

year 2014

population

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 30168248. | 11399212. | 4048500. | 844607. | 2562340. | 1234996. | 1264121. | 619648. | 8194827. |
| 5 | 28428734. | 10708959. | 3878319. | 796283. | 2291194. | 1169357. | 1149406. | 604359. | 7830857. |
| 10 | 26721646. | 9990904. | 3649547. | 737247. | 2068772. | 1098530. | 1042261. | 582484. | 7551899. |
| 15 | 25387812. | 10000361. | 3602690. | 731733. | 1809825. | 1022171. | 968053. | 579167. | 6673811. |
| 20 | 25646954. | 11597667. | 3960670. | 815092. | 1611050. | 1050641. | 958110. | 623508. | 5030217. |
| 25 | 25895650. | 12636748. | 4247056. | 846185. | 1462663. | 1067563. | 924302. | 686898. | 4024233. |
| 30 | 24550056. | 11958852. | 4090082. | 774641. | 1301955. | 979239. | 844216. | 682062. | 3919012. |
| 35 | 21984282. | 10708826. | 3634668. | 665335. | 1104916. | 857055. | 734381. | 616482. | 3662618. |
| 40 | 18099930. | 8785520. | 2948988. | 525034. | 871067. | 686575. | 601660. | 519804. | 3161282. |
| 45 | 20641710. | 10053680. | 3326731. | 581043. | 950944. | 763783. | 690969. | 579542. | 3695017. |
| 50 | 21544088. | 10544443. | 3467290. | 588264. | 952276. | 778487. | 694672. | 596249. | 3922409. |
| 55 | 18354400. | 9045345. | 2942912. | 474787. | 789379. | 643768. | 592541. | 493278. | 3372390. |
| 60 | 14833409. | 7301824. | 2350522. | 365327. | 608680. | 505853. | 473429. | 400311. | 2827463. |
| 65 | 8864866. | 4063342. | 1405869. | 202530. | 325852. | 280257. | 250386. | 272045. | 2064584. |
| 70 | 13122041. | 5813490. | 1914957. | 264670. | 446516. | 400960. | 391673. | 309725. | 3580049. |
| 75 | 8060504. | 3465300. | 1069403. | 151316. | 262566. | 226043. | 243742. | 205532. | 2436602. |
| 80 | 6509628. | 2697088. | 861998. | 117758. | 208946. | 180550. | 182778. | 154839. | 2105672. |
| 85 | 4318611. | 1726190. | 588895. | 88349. | 147488. | 114154. | 119020. | 107153. | 1427363. |
| total | 343132576. | 152497744. | 51989096. | 9570200. | 19776430. | 13059982. | 12125720. | 8633087. | 75480296. |

percentage distribution

| age | total | rsfsr | ukrmol | belssr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 8.7920 | 7.4750 | 7.7872 | 8.8254 | 12.9565 | 9.4563 | 10.4251 | 7.1776 | 10.8569 |
| 5 | 8.2851 | 7.0224 | 7.4599 | 8.3204 | 11.5855 | 8.9537 | 9.4791 | 7.0005 | 10.3747 |
| 10 | 7.7876 | 6.5515 | 7.0198 | 7.7036 | 10.4608 | 8.4114 | 8.5955 | 6.7471 | 10.0051 |
| 15 | 7.3988 | 6.5577 | 6.9297 | 7.6459 | 9.1514 | 7.8267 | 7.9835 | 6.7087 | 8.8418 |
| 20 | 7.4744 | 7.6051 | 7.6183 | 8.5170 | 8.1463 | 8.0447 | 7.9015 | 7.2223 | 6.6643 |
| 25 | 7.5468 | 8.2865 | 8.1691 | 8.8419 | 7.3960 | 8.1743 | 7.6227 | 7.9566 | 5.3315 |
| 30 | 7.1547 | 7.8420 | 7.8672 | 8.0943 | 6.5834 | 7.4980 | 6.9622 | 7.9006 | 5.1921 |
| 35 | 6.4069 | 7.0223 | 6.9912 | 6.9522 | 5.5870 | 6.5625 | 6.0564 | 7.1409 | 4.8524 |
| 40 | 5.2749 | 5.7611 | 5.6723 | 5.4861 | 4.4046 | 5.2571 | 4.9619 | 6.0211 | 4.1882 |
| 45 | 6.0157 | 6.5927 | 6.3989 | 6.0714 | 4.8085 | 5.8483 | 5.6984 | 6.7130 | 4.8953 |
| 50 | 6.2786 | 6.9145 | 6.6693 | 6.1468 | 4.8152 | 5.9609 | 5.7289 | 6.9066 | 5.1966 |
| 55 | 5.3491 | 5.9315 | 5.6606 | 4.9611 | 3.9915 | 4.9293 | 4.8866 | 5.7138 | 4.4679 |
| 60 | 4.3229 | 4.7882 | 4.5212 | 3.8173 | 3.0778 | 3.8733 | 3.9043 | 4.6369 | 3.7460 |
| 65 | 2.5835 | 2.6645 | 2.7042 | 2.1163 | 1.6477 | 2.1459 | 2.0649 | 3.1512 | 2.7353 |
| 70 | 3.8242 | 3.8122 | 3.6834 | 2.7656 | 2.2578 | 3.0701 | 3.2301 | 3.5877 | 4.7430 |
| 75 | 2.3491 | 2.2724 | 2.0570 | 1.5811 | 1.3277 | 1.7308 | 2.0101 | 2.3807 | 3.2281 |
| 80 | 1.8971 | 1.7686 | 1.6580 | 1.2305 | 1.0565 | 1.3825 | 1.5074 | 1.7935 | 2.7897 |
| 85 | 1.2586 | 1.1319 | 1.1327 | 0.9232 | 0.7458 | 0.8741 | 0.9816 | 1.2412 | 1.8910 |
| total | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 34.7709 | 36.2383 | 35.4646 | 32.8940 | 28.4084 | 32.6027 | 32.3202 | 36.4765 | 33.8069 |
| sha | 100.0000 | 44.4428 | 15.1513 | 2.7891 | 5.7635 | 3.8061 | 3.5338 | 2.5160 | 21.9974 |
| lam | 1.037457 | 1.043963 | 1.046643 | 1.049631 | 1.069909 | 1.043574 | 1.056135 | 1.052906 | 1.003744 |
| r | 0.007354 | 0.008605 | 0.009118 | 0.009688 | 0.013515 | 0.008530 | 0.010923 | 0.010311 | 0.000747 |

APPENDIX C *Continued.*

year 2024

population

| age | total | rafar | ukrmol | belasr | uzkitatu | kazakh | grazarm | ealali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31023466. | 11630782. | 4168198. | 864878. | 2785762. | 1276938. | 1331943. | 644657. | 8320308. |
| 5 | 29892368. | 11240555. | 4093414. | 841850. | 2561905. | 1239641. | 1256918. | 649174. | 8008912. |
| 10 | 29376866. | 11093017. | 4041128. | 822309. | 2410760. | 1216361. | 1204239. | 648665. | 7940386. |
| 15 | 28243110. | 11243359. | 4040309. | 820797. | 2120342. | 1143546. | 1115597. | 640325. | 7118834. |
| 20 | 26440736. | 11944030. | 4103658. | 838445. | 1742267. | 1087078. | 1000908. | 643336. | 5081011. |
| 25 | 24958736. | 12113194. | 4094897. | 812781. | 1473478. | 1031718. | 909940. | 669440. | 3853287. |
| 30 | 25117272. | 12168504. | 4179221. | 792746. | 1387016. | 1003263. | 892505. | 707197. | 3986823. |
| 35 | 25242022. | 12252077. | 4163883. | 763567. | 1322497. | 983907. | 877899. | 709859. | 4168333. |
| 40 | 23697226. | 11533622. | 3846361. | 683380. | 1182109. | 899033. | 808749. | 663051. | 4080959. |
| 45 | 20898068. | 10180649. | 3378026. | 586821. | 994594. | 774333. | 695865. | 587902. | 3699878. |
| 50 | 16758495. | 8135670. | 2713235. | 459069. | 768604. | 605363. | 555309. | 482430. | 3038814. |
| 55 | 18725020. | 9114705. | 3019579. | 495424. | 829430. | 658212. | 624742. | 526420. | 3456507. |
| 60 | 19250998. | 9390994. | 3095804. | 489722. | 817521. | 651294. | 615770. | 534776. | 3655117. |
| 65 | 15642092. | 7628033. | 2487974. | 376638. | 638515. | 508123. | 495334. | 429451. | 3078024. |
| 70 | 11523078. | 5573528. | 1802810. | 268687. | 453921. | 368434. | 361633. | 322245. | 2371820. |
| 75 | 5923610. | 2678379. | 927384. | 132272. | 217828. | 180103. | 167365. | 187102. | 1433176. |
| 80 | 6903304. | 3022873. | 999423. | 141484. | 245870. | 206715. | 209752. | 172114. | 1905073. |
| 85 | 4900561. | 2054395. | 639715. | 103316. | 189410. | 140320. | 160884. | 131425. | 1481095. |
| total | 364517056. | 162998384. | 55795028. | 10294144. | 22141830. | 13974382. | 13285350. | 9349569. | 76678360. |

percentage distribution

| age | total | rafar | ukrmol | belasr | uzkitatu | kazakh | grazarm | ealali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 8.5108 | 7.1355 | 7.4706 | 8.4016 | 12.5814 | 9.1377 | 10.0257 | 6.8950 | 10.8509 |
| 5 | 8.2005 | 6.8961 | 7.3365 | 8.1779 | 11.5704 | 8.8708 | 9.4609 | 6.9438 | 10.4448 |
| 10 | 8.0591 | 6.8056 | 7.2428 | 7.9881 | 10.8878 | 8.7042 | 9.0648 | 6.9379 | 10.3554 |
| 15 | 7.7481 | 6.8978 | 7.2413 | 7.9734 | 9.5762 | 8.1832 | 8.3972 | 6.8487 | 9.2840 |
| 20 | 7.2536 | 7.3277 | 7.3549 | 8.1449 | 7.8687 | 7.7791 | 7.5339 | 6.8809 | 6.6264 |
| 25 | 6.8471 | 7.4315 | 7.3392 | 7.8956 | 6.6547 | 7.3829 | 6.8492 | 7.1601 | 5.0253 |
| 30 | 6.8908 | 7.4654 | 7.4903 | 7.7009 | 6.2642 | 7.1793 | 6.7180 | 7.5640 | 5.1994 |
| 35 | 6.9248 | 7.5167 | 7.4628 | 7.4175 | 5.9728 | 7.0408 | 6.6080 | 7.5924 | 5.4361 |
| 40 | 6.5010 | 7.0759 | 6.8937 | 6.6381 | 5.3388 | 6.4334 | 6.0875 | 7.0918 | 5.3222 |
| 45 | 5.7331 | 6.2459 | 6.0543 | 5.7005 | 4.4919 | 5.5411 | 5.2378 | 6.2880 | 4.8252 |
| 50 | 4.5975 | 4.9913 | 4.8629 | 4.4595 | 3.4713 | 4.3319 | 4.1799 | 5.1599 | 3.9631 |
| 55 | 5.1369 | 5.5919 | 5.4119 | 4.8127 | 3.7460 | 4.7101 | 4.7025 | 5.6304 | 4.5078 |
| 60 | 5.2812 | 5.7614 | 5.5485 | 4.7573 | 3.6922 | 4.6606 | 4.6350 | 5.7198 | 4.7668 |
| 65 | 4.2912 | 4.6798 | 4.4591 | 3.6588 | 2.8838 | 3.6361 | 3.7284 | 4.5933 | 4.0142 |
| 70 | 3.1612 | 3.4194 | 3.2311 | 2.6101 | 2.0501 | 2.6365 | 2.7220 | 3.4466 | 3.0932 |
| 75 | 1.6251 | 1.6432 | 1.6621 | 1.2849 | 0.9838 | 1.2888 | 1.2598 | 2.0012 | 1.8691 |
| 80 | 1.8938 | 1.8545 | 1.7912 | 1.3748 | 1.1104 | 1.4792 | 1.5788 | 1.8409 | 2.4845 |
| 85 | 1.3444 | 1.2604 | 1.1465 | 1.0036 | 0.8554 | 1.0041 | 1.2110 | 1.4057 | 1.9316 |
| total | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 34.8833 | 36.6457 | 35.8756 | 33.4862 | 28.6418 | 32.8934 | 32.5018 | 37.0026 | 32.9213 |
| sha | 100.0000 | 44.7163 | 15.3066 | 2.8240 | 6.0743 | 3.8337 | 3.6446 | 2.5649 | 21.0356 |
| lam | 1.028076 | 1.030468 | 1.032617 | 1.033382 | 1.053574 | 1.031024 | 1.042998 | 1.036710 | 1.008089 |
| r | 0.005538 | 0.006003 | 0.006419 | 0.006567 | 0.010438 | 0.006111 | 0.008420 | 0.007210 | 0.001611 |

stable equivalent to original population

| age | total | rafsr | ukrmol | belasr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23178306. | 8509388. | 3037928. | 624113. | 2420366. | 949965. | 1168920. | 468260. | 5999365. |
| 5 | 21974078. | 8064680. | 2937312. | 595948. | 2231727. | 908445. | 1092484. | 464822. | 5678659. |
| 10 | 21280850. | 7823110. | 2859839. | 573640. | 2125357. | 882033. | 1046250. | 461459. | 5509160. |
| 15 | 20589840. | 8005596. | 2882395. | 579178. | 1899954. | 836731. | 984314. | 461476. | 4980196. |
| 20 | 19861786. | 8812963. | 3016248. | 611073. | 1557428. | 818100. | 898057. | 474185. | 3673734. |
| 25 | 19093432. | 9126073. | 3070528. | 603679. | 1287379. | 789901. | 810223. | 499584. | 2906063. |
| 30 | 18347066. | 8759481. | 3000126. | 562695. | 1150121. | 734738. | 751458. | 506228. | 2882222. |
| 35 | 17558188. | 8386140. | 2846012. | 516005. | 1053001. | 687092. | 710600. | 486880. | 2868458. |
| 40 | 16703913. | 7993695. | 2664864. | 469167. | 960086. | 636547. | 670401. | 463770. | 2845383. |
| 45 | 15739119. | 7538451. | 2497612. | 429952. | 874045. | 585860. | 627753. | 437789. | 2747658. |
| 50 | 14587217. | 6991712. | 2315101. | 387473. | 783663. | 529705. | 577773. | 406660. | 2595131. |
| 55 | 13466287. | 6455711. | 2139251. | 346129. | 706180. | 476366. | 530855. | 374900. | 2436895. |
| 60 | 12293340. | 5882237. | 1950153. | 304449. | 625677. | 418163. | 479715. | 343490. | 2289456. |
| 65 | 10824217. | 5146258. | 1705861. | 258915. | 532108. | 354647. | 416603. | 306746. | 2103078. |
| 70 | 9009059. | 4244549. | 1409653. | 210957. | 433993. | 287691. | 344123. | 259712. | 1818381. |
| 75 | 6824037. | 3186968. | 1060338. | 158482. | 329116. | 214392. | 260739. | 199816. | 1414185. |
| 80 | 4475407. | 2067171. | 688532. | 104639. | 219941. | 139247. | 172730. | 132617. | 950530. |
| 85 | 3926785. | 1759166. | 585185. | 98808. | 215452. | 123086. | 160924. | 117188. | 866976. |
| total | 269728928. | 118753352. | 40666936. | 7435302. | 19405596. | 10372708. | 11703923. | 6865580. | 54525532. |

percentage distribution

| age | total | rafsr | ukrmol | belasr | uzkitatu | kazakh | grazarm | eslali | rural |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 8.5932 | 7.1656 | 7.4703 | 8.3939 | 12.4725 | 9.1583 | 9.9874 | 6.8204 | 11.0029 |
| 5 | 8.1467 | 6.7911 | 7.2229 | 8.0151 | 11.5004 | 8.7580 | 9.3343 | 6.7703 | 10.4147 |
| 10 | 7.8897 | 6.5877 | 7.0323 | 7.7151 | 10.9523 | 8.5034 | 8.9393 | 6.7213 | 10.1038 |
| 15 | 7.6335 | 6.7414 | 7.0878 | 7.7896 | 9.7908 | 8.0667 | 8.4101 | 6.7216 | 9.0603 |
| 20 | 7.3636 | 7.4212 | 7.4170 | 8.2185 | 8.0257 | 7.8870 | 7.6731 | 6.9067 | 6.7376 |
| 25 | 7.0787 | 7.6849 | 7.5504 | 8.1191 | 6.6341 | 7.6152 | 6.9227 | 7.2766 | 5.3297 |
| 30 | 6.8020 | 7.3762 | 7.3773 | 7.5679 | 5.9267 | 7.0834 | 6.4206 | 7.3734 | 5.2860 |
| 35 | 6.5081 | 7.0618 | 6.9983 | 6.9399 | 5.4263 | 6.6240 | 6.0715 | 7.0916 | 5.2608 |
| 40 | 6.1929 | 6.7313 | 6.5529 | 6.3100 | 4.9475 | 6.1367 | 5.7280 | 6.7550 | 5.2184 |
| 45 | 5.8352 | 6.3480 | 6.1416 | 5.7826 | 4.5041 | 5.6481 | 5.3636 | 6.3766 | 5.0392 |
| 50 | 5.4081 | 5.8876 | 5.6928 | 5.2113 | 4.0383 | 5.1067 | 4.9366 | 5.9232 | 4.7595 |
| 55 | 4.9925 | 5.4362 | 5.2604 | 4.6552 | 3.6391 | 4.5925 | 4.5357 | 5.4606 | 4.4693 |
| 60 | 4.5577 | 4.9533 | 4.7954 | 4.0946 | 3.2242 | 4.0314 | 4.0988 | 5.0031 | 4.1989 |
| 65 | 4.0130 | 4.3336 | 4.1947 | 3.4822 | 2.7420 | 3.4190 | 3.5595 | 4.4679 | 3.8571 |
| 70 | 3.3400 | 3.5743 | 3.4663 | 2.8372 | 2.2364 | 2.7735 | 2.9402 | 3.7828 | 3.3349 |
| 75 | 2.5300 | 2.6837 | 2.6074 | 2.1315 | 1.6960 | 2.0669 | 2.2278 | 2.9104 | 2.5936 |
| 80 | 1.6592 | 1.7407 | 1.6931 | 1.4073 | 1.1334 | 1.3424 | 1.4758 | 1.9316 | 1.7433 |
| 85 | 1.4558 | 1.4814 | 1.4390 | 1.3289 | 1.1103 | 1.1866 | 1.3750 | 1.7069 | 1.5900 |
| total | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 35.0985 | 37.0377 | 36.3491 | 34.0660 | 29.0110 | 33.2139 | 32.9577 | 37.6827 | 32.7423 |
| sha | 100.0000 | 44.0269 | 15.0770 | 2.7566 | 7.1945 | 3.8456 | 4.3391 | 2.5454 | 20.2149 |
| lam | 1.029701 | 1.029699 | 1.029699 | 1.029698 | 1.029700 | 1.029699 | 1.029745 | 1.029698 | 1.029699 |
| r | 0.005854 | 0.005853 | 0.005853 | 0.005853 | 0.005853 | 0.005853 | 0.005862 | 0.005853 | 0.005853 |

APPENDIX C *Continued.*

year 1984

population

| age | total | urban | rural |
|---|---|---|---|
| 0 | 25939202. | 17240802. | 8698399. |
| 5 | 23069486. | 14485510. | 8583976. |
| 10 | 19365460. | 10733225. | 8632235. |
| 15 | 22676004. | 13548189. | 9127814. |
| 20 | 24623316. | 18499324. | 6123992. |
| 25 | 21840008. | 18326316. | 3513691. |
| 30 | 18581226. | 15497578. | 3083649. |
| 35 | 12066914. | 9225937. | 2840977. |
| 40 | 20408984. | 14544170. | 5864815. |
| 45 | 15582644. | 10570485. | 5012159. |
| 50 | 17769966. | 11750969. | 6018998. |
| 55 | 12443269. | 8183900. | 4259370. |
| 60 | 8027426. | 5128515. | 2898912. |
| 65 | 9968281. | 6056265. | 3912017. |
| 70 | 10419050. | 5941274. | 4477776. |
| 75 | 6721822. | 3666341. | 3055481. |
| 80 | 4009871. | 2115866. | 1894005. |
| 85 | 2645108. | 1414607. | 1230501. |
| total | 276158080. | 186929296. | 89228776. |

percentage distribution

| age | total | urban | rural |
|---|---|---|---|
| 0 | 9.3929 | 9.2232 | 9.7484 |
| 5 | 8.3537 | 7.7492 | 9.6202 |
| 10 | 7.0125 | 5.7419 | 9.6743 |
| 15 | 8.2112 | 7.2478 | 10.2297 |
| 20 | 8.9164 | 9.8964 | 6.8632 |
| 25 | 7.9085 | 9.8039 | 3.9378 |
| 30 | 6.7285 | 8.2906 | 3.4559 |
| 35 | 4.3696 | 4.9355 | 3.1839 |
| 40 | 7.3903 | 7.7806 | 6.5728 |
| 45 | 5.6427 | 5.6548 | 5.6172 |
| 50 | 6.4347 | 6.2863 | 6.7456 |
| 55 | 4.5059 | 4.3781 | 4.7735 |
| 60 | 2.9068 | 2.7436 | 3.2489 |
| 65 | 3.6096 | 3.2399 | 4.3843 |
| 70 | 3.7729 | 3.1784 | 5.0183 |
| 75 | 2.4340 | 1.9614 | 3.4243 |
| 80 | 1.4520 | 1.1319 | 2.1226 |
| 85 | 0.9578 | 0.7568 | 1.3790 |
| total | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 33.8825 | 33.3984 | 34.8967 |
| sha | 100.0000 | 67.6892 | 32.3108 |
| lam | 1.048581 | 1.111588 | 0.937282 |
| r | 0.009488 | 0.021158 | -0.012954 |

year 1994

population

| age | total | urban | rural |
|---|---|---|---|
| 0 | 26461310. | 18412272. | 8049038. |
| 5 | 26401622. | 18154442. | 8247179. |
| 10 | 25258440. | 17050816. | 8207624. |
| 15 | 22914346. | 15635603. | 7278742. |
| 20 | 19150082. | 14615241. | 4534840. |
| 25 | 22278140. | 18617590. | 3660550. |
| 30 | 24109808. | 20150054. | 3959755. |
| 35 | 21288868. | 17726660. | 3562209. |
| 40 | 17934580. | 14777171. | 3157409. |
| 45 | 11462284. | 8857513. | 2604771. |
| 50 | 18869942. | 13787686. | 5082255. |
| 55 | 14116721. | 9872382. | 4244339. |
| 60 | 15884334. | 10718126. | 5166208. |
| 65 | 10634649. | 7050366. | 3584283. |
| 70 | 6260238. | 4022104. | 2238134. |
| 75 | 6670735. | 4107020. | 2563714. |
| 80 | 5478684. | 3199266. | 2279418. |
| 85 | 4076014. | 2312603. | 1763411. |
| total | 299250816. | 219066944. | 80183872. |

percentage distribution

| age | total | urban | rural |
|---|---|---|---|
| 0 | 8.8425 | 8.4049 | 10.0382 |
| 5 | 8.8226 | 8.2872 | 10.2853 |
| 10 | 8.4406 | 7.7834 | 10.2360 |
| 15 | 7.6572 | 7.1374 | 9.0776 |
| 20 | 6.3993 | 6.6716 | 5.6556 |
| 25 | 7.4446 | 8.4986 | 4.5652 |
| 30 | 8.0567 | 9.1981 | 4.9383 |
| 35 | 7.1141 | 8.0919 | 4.4426 |
| 40 | 5.9932 | 6.7455 | 3.9377 |
| 45 | 3.8303 | 4.0433 | 3.2485 |
| 50 | 6.3057 | 6.2938 | 6.3383 |
| 55 | 4.7174 | 4.5066 | 5.2933 |
| 60 | 5.3080 | 4.8926 | 6.4430 |
| 65 | 3.5538 | 3.2184 | 4.4701 |
| 70 | 2.0920 | 1.8360 | 2.7913 |
| 75 | 2.2291 | 1.8748 | 3.1973 |
| 80 | 1.8308 | 1.4604 | 2.8427 |
| 85 | 1.3621 | 1.0557 | 2.1992 |
| total | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 34.1035 | 33.7415 | 35.0923 |
| sha | 100.0000 | 73.2051 | 26.7949 |
| lam | 1.036843 | 1.071204 | 0.953301 |
| r | 0.007236 | 0.013757 | -0.009565 |

year 2004

population

| age | total | urban | rural |
|---|---|---|---|
| 0 | 27183742. | 19355850. | 7827892. |
| 5 | 25368412. | 17938120. | 7430292. |
| 10 | 25769852. | 18083256. | 7686596. |
| 15 | 26227036. | 18955202. | 7271834. |
| 20 | 24987926. | 19893702. | 5094225. |
| 25 | 22520844. | 18957136. | 3563707. |
| 30 | 18751790. | 15696273. | 3055518. |
| 35 | 21715496. | 18047448. | 3668048. |
| 40 | 23271118. | 19200966. | 4070152. |
| 45 | 20237124. | 16651029. | 3586094. |
| 50 | 16605678. | 13581591. | 3024087. |
| 55 | 10393825. | 8069724. | 2324102. |
| 60 | 16865594. | 12394276. | 4471317. |
| 65 | 12055603. | 8436651. | 3618952. |
| 70 | 12376467. | 8346062. | 4030405. |
| 75 | 7111723. | 4729970. | 2381752. |
| 80 | 3291189. | 2134015. | 1157174. |
| 85 | 4043011. | 2535391. | 1507620. |
| total | 318776416. | 243006656. | 75769760. |

percentage distribution

| age | total | urban | rural |
|---|---|---|---|
| 0 | 8.5275 | 7.9652 | 10.3312 |
| 5 | 7.9581 | 7.3817 | 9.8064 |
| 10 | 8.0840 | 7.4415 | 10.1447 |
| 15 | 8.2274 | 7.8003 | 9.5973 |
| 20 | 7.8387 | 8.1865 | 6.7233 |
| 25 | 7.0648 | 7.8011 | 4.7033 |
| 30 | 5.8824 | 6.4592 | 4.0326 |
| 35 | 6.8121 | 7.4267 | 4.8410 |
| 40 | 7.3001 | 7.9014 | 5.3717 |
| 45 | 6.3484 | 6.8521 | 4.7329 |
| 50 | 5.2092 | 5.5890 | 3.9912 |
| 55 | 3.2605 | 3.3208 | 3.0673 |
| 60 | 5.2907 | 5.1004 | 5.9012 |
| 65 | 3.7818 | 3.4718 | 4.7762 |
| 70 | 3.8825 | 3.4345 | 5.3193 |
| 75 | 2.2309 | 1.9464 | 3.1434 |
| 80 | 1.0324 | 0.8782 | 1.5272 |
| 85 | 1.2683 | 1.0433 | 1.9897 |
| total | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 34.5256 | 34.5431 | 34.4695 |
| sha | 100.0000 | 76.2311 | 23.7689 |
| lam | 1.031415 | 1.049731 | 0.976757 |
| r | 0.006186 | 0.009707 | -0.004703 |

year 2014

population

| age | total | urban | rural |
|---|---|---|---|
| 0 | 29739672. | 21576386. | 8163286. |
| 5 | 28099198. | 20296188. | 7803009. |
| 10 | 26475010. | 18945544. | 7529467. |
| 15 | 25201586. | 18545994. | 6655592. |
| 20 | 25496208. | 20483642. | 5012566. |
| 25 | 25781298. | 21776080. | 4005217. |
| 30 | 24472104. | 20572036. | 3900069. |
| 35 | 21952872. | 18306408. | 3646464. |
| 40 | 18099696. | 14949708. | 3149987. |
| 45 | 20642316. | 16960374. | 3681943. |
| 50 | 21547112. | 17642522. | 3904591. |
| 55 | 18359928. | 15003451. | 3356477. |
| 60 | 14839633. | 12027254. | 2812379. |
| 65 | 8863652. | 6808601. | 2055051. |
| 70 | 13121408. | 9550592. | 3570816. |
| 75 | 8058233. | 5624634. | 2433599. |
| 80 | 6506098. | 4403566. | 2102532. |
| 85 | 4308767. | 2883292. | 1425475. |
| total | 341564832. | 266356304. | 75208520. |

percentage distribution

| age | total | urban | rural |
|---|---|---|---|
| 0 | 8.7069 | 8.1006 | 10.8542 |
| 5 | 8.2266 | 7.6199 | 10.3752 |
| 10 | 7.7511 | 7.1129 | 10.0115 |
| 15 | 7.3783 | 6.9629 | 8.8495 |
| 20 | 7.4645 | 7.6903 | 6.6649 |
| 25 | 7.5480 | 8.1755 | 5.3255 |
| 30 | 7.1647 | 7.7235 | 5.1857 |
| 35 | 6.4271 | 6.8729 | 4.8485 |
| 40 | 5.2991 | 5.6127 | 4.1883 |
| 45 | 6.0435 | 6.3676 | 4.8956 |
| 50 | 6.3084 | 6.6237 | 5.1917 |
| 55 | 5.3752 | 5.6328 | 4.4629 |
| 60 | 4.3446 | 4.5155 | 3.7394 |
| 65 | 2.5950 | 2.5562 | 2.7325 |
| 70 | 3.8416 | 3.5856 | 4.7479 |
| 75 | 2.3592 | 2.1117 | 3.2358 |
| 80 | 1.9048 | 1.6533 | 2.7956 |
| 85 | 1.2615 | 1.0825 | 1.8954 |
| total | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 34.8698 | 35.1689 | 33.8108 |
| sha | 100.0000 | 77.9812 | 22.0188 |
| lam | 1.036317 | 1.046130 | 1.002995 |
| r | 0.007135 | 0.009020 | 0.000598 |

APPENDIX C *Continued.*

year 2024

population

| age | total | urban | rural |
|---|---|---|---|
| 0 | 30428400. | 22157624. | 8270776. |
| 5 | 29400860. | 21434158. | 7966702. |
| 10 | 28965766. | 21061804. | 7903962. |
| 15 | 27915216. | 20829860. | 7085356. |
| 20 | 26195132. | 21144220. | 5050911. |
| 25 | 24774736. | 20949210. | 3825525. |
| 30 | 24970768. | 21010934. | 3959834. |
| 35 | 25131538. | 20990660. | 4140878. |
| 40 | 23621838. | 19567406. | 4054431. |
| 45 | 20868598. | 17189344. | 3679253. |
| 50 | 16758990. | 13733419. | 3025571. |
| 55 | 18727316. | 15285902. | 3441414. |
| 60 | 19255508. | 15621261. | 3634247. |
| 65 | 15645190. | 12584999. | 3060191. |
| 70 | 11523509. | 9165523. | 2357986. |
| 75 | 5919580. | 4993541. | 1426040. |
| 80 | 6896685. | 4997339. | 1899346. |
| 85 | 4881082. | 3403053. | 1478028. |
| total | 361880704. | 285620256. | 76260448. |

stable equivalent to original population

| age | total | urban | rural |
|---|---|---|---|
| 0 | 23802024. | 17450764. | 6351261. |
| 5 | 22660502. | 16631969. | 6028534. |
| 10 | 22026296. | 16160101. | 5866194. |
| 15 | 21389244. | 16128857. | 5260388. |
| 20 | 20708550. | 16817538. | 3891014. |
| 25 | 19981522. | 16922058. | 3059463. |
| 30 | 19271484. | 16233653. | 3037832. |
| 35 | 18504832. | 15474993. | 3029839. |
| 40 | 17672296. | 14659565. | 3012730. |
| 45 | 16714985. | 13797147. | 2917838. |
| 50 | 15551750. | 12787420. | 2764330. |
| 55 | 14410485. | 11807012. | 2603473. |
| 60 | 13200982. | 10749059. | 2451923. |
| 65 | 11661619. | 9402911. | 2258708. |
| 70 | 9739212. | 7779282. | 1959930. |
| 75 | 7401697. | 5871517. | 1530180. |
| 80 | 4865674. | 3833659. | 1032015. |
| 85 | 4254259. | 3311536. | 942723. |
| total | 283817440. | 225819072. | 57998376. |

percentage distribution

| age | total | urban | rural |
|---|---|---|---|
| 0 | 8.4084 | 7.7577 | 10.8454 |
| 5 | 8.1245 | 7.5044 | 10.4467 |
| 10 | 8.0042 | 7.3741 | 10.3644 |
| 15 | 7.7139 | 7.2929 | 9.2910 |
| 20 | 7.2386 | 7.4029 | 6.6232 |
| 25 | 6.8461 | 7.3346 | 5.0164 |
| 30 | 6.9003 | 7.3562 | 5.1925 |
| 35 | 6.9447 | 7.3491 | 5.4299 |
| 40 | 6.5275 | 6.8508 | 5.3166 |
| 45 | 5.7667 | 6.0183 | 4.8246 |
| 50 | 4.6311 | 4.8083 | 3.9674 |
| 55 | 5.1750 | 5.3518 | 4.5127 |
| 60 | 5.3210 | 5.4692 | 4.7656 |
| 65 | 4.3233 | 4.4062 | 4.0128 |
| 70 | 3.1843 | 3.2090 | 3.0920 |
| 75 | 1.6358 | 1.5733 | 1.8700 |
| 80 | 1.9058 | 1.7496 | 2.4906 |
| 85 | 1.3488 | 1.1915 | 1.9381 |
| total | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 35.0212 | 35.5803 | 32.9272 |
| sna | 100.0000 | 78.9266 | 21.0734 |
| lam | 1.026628 | 1.031971 | 1.007100 |
| r | 0.005256 | 0.006294 | 0.001415 |

percentage distribution

| age | total | urban | rural |
|---|---|---|---|
| 0 | 8.3864 | 7.7278 | 10.9508 |
| 5 | 7.9842 | 7.3652 | 10.3943 |
| 10 | 7.7607 | 7.1562 | 10.1144 |
| 15 | 7.5363 | 7.1424 | 9.0699 |
| 20 | 7.2964 | 7.4474 | 6.7088 |
| 25 | 7.0403 | 7.4936 | 5.2751 |
| 30 | 6.7901 | 7.1888 | 5.2378 |
| 35 | 6.5200 | 6.8528 | 5.2240 |
| 40 | 6.2266 | 6.4917 | 5.1945 |
| 45 | 5.8893 | 6.1098 | 5.0309 |
| 50 | 5.4795 | 5.6627 | 4.7662 |
| 55 | 5.0774 | 5.2285 | 4.4889 |
| 60 | 4.6512 | 4.7600 | 4.2276 |
| 65 | 4.1088 | 4.1639 | 3.8944 |
| 70 | 3.4315 | 3.4449 | 3.3793 |
| 75 | 2.6079 | 2.6001 | 2.6383 |
| 80 | 1.7144 | 1.6977 | 1.7794 |
| 85 | 1.4989 | 1.4665 | 1.6254 |
| total | 100.0000 | 100.0000 | 100.0000 |
| m.ag | 35.4823 | 36.1551 | 32.8629 |
| sna | 100.0000 | 79.5649 | 20.4351 |
| lam | 1.025920 | 1.025920 | 1.025920 |
| r | 0.005118 | 0.005118 | 0.005118 |

*Appendix D*

## SINGLE-REGION LIFE TABLES, TOTAL POPULATION, 1974

LEGEND

$p(x)$: probability of survival from age $x$ to age $x + 5$

$q(x)$: probability that an individual of age $x$ dies before reaching age $x + 5$

$l(x)$: number surviving at exact age $x$, of 100 000 born

$d(x)$: number dying between ages $x$ and $x + 5$, of 100 000 born

$ll(x)$: number of years lived between ages $x$ and $x + 5$ per unit born

$m(x)$: age-specific death rate

$s(x)$: survivorship proportion – proportion of people $x$ to $x + 4$ years old that will survive to be $x + 5$ to $x + 9$ years old, 5 years later

$t(x)$: number of years expected to be lived beyond age $x$ by a newborn baby

$e(x)$: expectation of life at age $x$ – number of years expected to be lived beyond age $x$ by a person of age $x$

# APPENDIX D

Single-region life tables.

rsfsr mortality level = 69.44

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.957684 | 0.042316 | 100000. | 4232. | 4.894209 | 0.008646 | 0.976925 | 69.4403 | 69.4403 |
| 5 | 0.997017 | 0.002983 | 95768. | 286. | 4.781277 | 0.000597 | 0.997267 | 64.5461 | 67.3981 |
| 10 | 0.997517 | 0.002483 | 95483. | 237. | 4.768208 | 0.000497 | 0.996477 | 59.7648 | 62.5923 |
| 15 | 0.995434 | 0.004566 | 95246. | 435. | 4.751408 | 0.000915 | 0.993823 | 54.9966 | 57.7419 |
| 20 | 0.992204 | 0.007796 | 94811. | 739. | 4.722057 | 0.001565 | 0.989852 | 50.2452 | 52.9952 |
| 25 | 0.987482 | 0.012518 | 94072. | 1178. | 4.674137 | 0.002519 | 0.989086 | 45.5231 | 48.3920 |
| 30 | 0.990711 | 0.009289 | 92894. | 863. | 4.623123 | 0.001867 | 0.985189 | 40.8490 | 43.9738 |
| 35 | 0.979615 | 0.020385 | 92031. | 1876. | 4.554649 | 0.004119 | 0.979804 | 36.2258 | 39.3627 |
| 40 | 0.979997 | 0.020003 | 90155. | 1803. | 4.462665 | 0.004041 | 0.969837 | 31.6712 | 35.1297 |
| 45 | 0.959470 | 0.040530 | 88352. | 3581. | 4.328058 | 0.008274 | 0.954367 | 27.2085 | 30.7957 |
| 50 | 0.949048 | 0.050952 | 84771. | 4319. | 4.130555 | 0.010457 | 0.950536 | 22.8805 | 26.9910 |
| 55 | 0.952104 | 0.047896 | 80451. | 3853. | 3.926242 | 0.009814 | 0.938500 | 18.7499 | 23.3059 |
| 60 | 0.924212 | 0.075788 | 76598. | 5805. | 3.684778 | 0.015755 | 0.902590 | 14.8237 | 19.3525 |
| 65 | 0.879196 | 0.120804 | 70793. | 8552. | 3.325846 | 0.025714 | 0.852463 | 11.1389 | 15.7345 |
| 70 | 0.822057 | 0.177943 | 62241. | 11075. | 2.835160 | 0.039064 | 0.776534 | 7.8131 | 12.5529 |
| 75 | 0.721157 | 0.278843 | 51166. | 14267. | 2.201597 | 0.064804 | 0.670563 | 4.9779 | 9.7290 |
| 80 | 0.600408 | 0.399592 | 36898. | 14744. | 1.476310 | 0.099873 | 0.880562 | 2.7763 | 7.5242 |
| 85 | 0.000000 | 1.000000 | 22154. | 22154. | 1.299983 | 0.170418 | 0.000000 | 1.3000 | 5.8679 |

net reproduction rate 0.938230

net migraproduction rate 4.853773

ukrmol mortality level = 71.50

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.972147 | 0.027853 | 100000. | 2785. | 4.930369 | 0.005649 | 0.984681 | 71.4954 | 71.4954 |
| 5 | 0.997574 | 0.002426 | 97215. | 236. | 4.854841 | 0.000486 | 0.997776 | 66.5650 | 68.4722 |
| 10 | 0.997979 | 0.002021 | 96979. | 196. | 4.844045 | 0.000405 | 0.997253 | 61.7102 | 63.6326 |
| 15 | 0.996525 | 0.003475 | 96783. | 336. | 4.830737 | 0.000696 | 0.995378 | 56.8661 | 58.7564 |
| 20 | 0.994226 | 0.005774 | 96447. | 557. | 4.808409 | 0.001158 | 0.993172 | 52.0354 | 53.9526 |
| 25 | 0.992111 | 0.007889 | 95890. | 756. | 4.775576 | 0.001584 | 0.992422 | 47.2270 | 49.2514 |
| 30 | 0.992736 | 0.007264 | 95133. | 691. | 4.739388 | 0.001456 | 0.987357 | 42.4514 | 44.6231 |
| 35 | 0.981940 | 0.018060 | 94442. | 1706. | 4.679470 | 0.003645 | 0.982791 | 37.7120 | 39.9313 |
| 40 | 0.983657 | 0.016343 | 92737. | 1516. | 4.598939 | 0.003295 | 0.974975 | 33.0326 | 35.6198 |
| 45 | 0.966148 | 0.033852 | 91221. | 3088. | 4.483850 | 0.006887 | 0.958886 | 28.4336 | 31.1700 |
| 50 | 0.951370 | 0.048630 | 88133. | 4286. | 4.299502 | 0.009968 | 0.953890 | 23.9498 | 27.1746 |
| 55 | 0.956538 | 0.043462 | 83847. | 3644. | 4.101252 | 0.008885 | 0.941228 | 19.6503 | 23.4358 |
| 60 | 0.925221 | 0.074779 | 80203. | 5997. | 3.860211 | 0.015537 | 0.904606 | 15.5490 | 19.3871 |
| 65 | 0.882325 | 0.117675 | 74205. | 8732. | 3.491971 | 0.025006 | 0.853740 | 11.6888 | 15.7519 |
| 70 | 0.821343 | 0.178657 | 65473. | 11697. | 2.981235 | 0.039236 | 0.775686 | 8.1968 | 12.5193 |
| 75 | 0.720098 | 0.279902 | 53776. | 15052. | 2.312502 | 0.065090 | 0.669399 | 5.2156 | 9.6987 |
| 80 | 0.598993 | 0.401007 | 38724. | 15529. | 1.547986 | 0.100315 | 0.875404 | 2.9031 | 7.4969 |
| 85 | 0.000000 | 1.000000 | 23195. | 23195. | 1.355114 | 0.171170 | 0.000000 | 1.3551 | 5.8422 |

net reproduction rate 0.987480

net migraproduction rate 4.669429

belssr mortality level = 73.49

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.975817 | 0.024183 | 100000. | 2418. | 4.939543 | 0.004896 | 0.986970 | 73.4949 | 73.4949 |
| 5 | 0.998399 | 0.001601 | 97582. | 156. | 4.875179 | 0.000321 | 0.998335 | 68.5554 | 70.2543 |
| 10 | 0.998271 | 0.001729 | 97425. | 168. | 4.867061 | 0.000346 | 0.997822 | 63.6802 | 65.3630 |
| 15 | 0.997373 | 0.002627 | 97257. | 255. | 4.856462 | 0.000526 | 0.996606 | 58.8131 | 60.4719 |
| 20 | 0.995836 | 0.004164 | 97002. | 404. | 4.839979 | 0.000835 | 0.994064 | 53.9567 | 55.6245 |
| 25 | 0.992285 | 0.007715 | 96598. | 745. | 4.811249 | 0.001549 | 0.993150 | 49.1167 | 50.8467 |
| 30 | 0.994021 | 0.005979 | 95852. | 573. | 4.778291 | 0.001199 | 0.989783 | 44.3054 | 46.2226 |
| 35 | 0.985520 | 0.014480 | 95279. | 1380. | 4.729474 | 0.002917 | 0.984854 | 39.5271 | 41.4855 |
| 40 | 0.984179 | 0.015821 | 93900. | 1486. | 4.657842 | 0.003190 | 0.978701 | 34.7977 | 37.0584 |
| 45 | 0.973135 | 0.026865 | 92414. | 2483. | 4.558634 | 0.005446 | 0.964005 | 30.1398 | 32.6139 |
| 50 | 0.954622 | 0.045378 | 89931. | 4081. | 4.394545 | 0.009286 | 0.955259 | 25.5812 | 28.4452 |
| 55 | 0.955926 | 0.044074 | 85850. | 3784. | 4.197927 | 0.009014 | 0.945070 | 21.1866 | 24.6786 |
| 60 | 0.933713 | 0.066287 | 82067. | 5440. | 3.967333 | 0.013712 | 0.917835 | 16.9887 | 20.7011 |
| 65 | 0.900830 | 0.099170 | 76627. | 7599. | 3.641358 | 0.020869 | 0.872969 | 13.0214 | 16.9933 |
| 70 | 0.842041 | 0.157959 | 69028. | 10904. | 3.178792 | 0.034301 | 0.800385 | 9.3800 | 13.5888 |
| 75 | 0.750914 | 0.249086 | 58124. | 14478. | 2.544256 | 0.056904 | 0.703468 | 6.2012 | 10.6690 |
| 80 | 0.640283 | 0.359717 | 43646. | 15700. | 1.789803 | 0.087721 | 1.043230 | 3.6570 | 8.3787 |
| 85 | 0.000000 | 1.000000 | 27946. | 27946. | 1.867175 | 0.149669 | 0.000000 | 1.8672 | 6.6814 |

net reproduction rate 1.043803

net migraproduction rate 5.353656

uzkitatu mortality level = 68.27

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.931781 | 0.068219 | 100000. | 6822. | 4.829453 | 0.014126 | 0.963045 | 68.2745 | 68.2745 |
| 5 | 0.996598 | 0.003402 | 93178. | 317. | 4.650980 | 0.000682 | 0.996897 | 63.4450 | 68.0900 |
| 10 | 0.997198 | 0.002802 | 92861. | 260. | 4.636549 | 0.000561 | 0.996409 | 58.7940 | 63.3140 |
| 15 | 0.995618 | 0.004382 | 92601. | 406. | 4.619901 | 0.000878 | 0.994158 | 54.1575 | 58.4849 |
| 20 | 0.992692 | 0.007308 | 92195. | 674. | 4.592913 | 0.001467 | 0.990292 | 49.5376 | 53.7312 |
| 25 | 0.987875 | 0.012125 | 91521. | 1110. | 4.548326 | 0.002440 | 0.989220 | 44.9447 | 49.1084 |
| 30 | 0.990582 | 0.009418 | 90412. | 851. | 4.499297 | 0.001893 | 0.984973 | 40.3963 | 44.6804 |
| 35 | 0.979310 | 0.020690 | 89560. | 1853. | 4.431685 | 0.004181 | 0.979254 | 35.8970 | 40.0815 |
| 40 | 0.979197 | 0.020803 | 87707. | 1825. | 4.339747 | 0.004204 | 0.968322 | 31.4654 | 35.8755 |
| 45 | 0.957216 | 0.042784 | 85883. | 3674. | 4.202273 | 0.008744 | 0.952608 | 27.1256 | 31.5845 |
| 50 | 0.947794 | 0.052206 | 82208. | 4292. | 4.003119 | 0.010721 | 0.948512 | 22.9233 | 27.8845 |
| 55 | 0.949269 | 0.050731 | 77916. | 3953. | 3.797004 | 0.010410 | 0.936437 | 18.9202 | 24.2827 |
| 60 | 0.922919 | 0.077081 | 73964. | 5701. | 3.555655 | 0.016034 | 0.905358 | 15.1232 | 20.4468 |
| 65 | 0.886329 | 0.113671 | 68263. | 7759. | 3.219139 | 0.024104 | 0.867195 | 11.5676 | 16.9457 |
| 70 | 0.845607 | 0.154393 | 60503. | 9341. | 2.791622 | 0.033462 | 0.804675 | 8.3484 | 13.7984 |
| 75 | 0.756270 | 0.243730 | 51162. | 12470. | 2.246349 | 0.055511 | 0.709491 | 5.5568 | 10.8612 |
| 80 | 0.647636 | 0.352364 | 38692. | 13634. | 1.593764 | 0.085544 | 1.077130 | 3.3105 | 8.5559 |
| 85 | 0.000000 | 1.000000 | 25058. | 25058. | 1.716691 | 0.145969 | 0.000000 | 1.7167 | 6.8508 |

net reproduction rate 1.741488

net migraproduction rate 3.847300

APPENDIX D *Continued.*

kazakh mortality level = 68.55

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.952454 | 0.047546 | 100000. | 4755. | 4.661135 | 0.009741 | 0.974135 | 68.5508 | 68.5508 |
| 5 | 0.996899 | 0.003101 | 95245. | 295. | 4.754886 | 0.000621 | 0.997076 | 63.6697 | 66.8480 |
| 10 | 0.997253 | 0.002747 | 94950. | 261. | 4.740963 | 0.000550 | 0.995881 | 58.9146 | 62.0482 |
| 15 | 0.994506 | 0.005494 | 94689. | 520. | 4.721457 | 0.001102 | 0.992668 | 54.1738 | 57.2122 |
| 20 | 0.990821 | 0.009179 | 94169. | 864. | 4.686840 | 0.001844 | 0.988596 | 49.4524 | 52.5145 |
| 25 | 0.986352 | 0.013648 | 93305. | 1273. | 4.633393 | 0.002748 | 0.988258 | 44.7655 | 47.9778 |
| 30 | 0.990191 | 0.009809 | 92031. | 903. | 4.578988 | 0.001972 | 0.983009 | 40.1321 | 43.6071 |
| 35 | 0.975757 | 0.024243 | 91128. | 2209. | 4.501188 | 0.004906 | 0.977596 | 35.5531 | 39.0143 |
| 40 | 0.979486 | 0.020514 | 88919. | 1824. | 4.400355 | 0.004145 | 0.967386 | 31.0519 | 34.9215 |
| 45 | 0.955033 | 0.044967 | 87095. | 3916. | 4.256842 | 0.009200 | 0.950574 | 26.6516 | 30.6006 |
| 50 | 0.945904 | 0.054096 | 83179. | 4500. | 4.046442 | 0.011120 | 0.943417 | 22.3947 | 26.9237 |
| 55 | 0.940787 | 0.059213 | 78679. | 4658. | 3.817462 | 0.012204 | 0.929298 | 18.3483 | 23.3204 |
| 60 | 0.917085 | 0.082915 | 74020. | 6137. | 3.547577 | 0.017300 | 0.899792 | 14.5306 | 19.6309 |
| 65 | 0.880936 | 0.119064 | 67883. | 8082. | 3.192082 | 0.025320 | 0.857884 | 10.9832 | 16.1797 |
| 70 | 0.831716 | 0.168284 | 59800. | 10063. | 2.736436 | 0.036749 | 0.788019 | 7.7912 | 13.0286 |
| 75 | 0.735481 | 0.264519 | 49737. | 13156. | 2.157940 | 0.060967 | 0.686370 | 5.0527 | 10.1589 |
| 80 | 0.619596 | 0.380404 | 36581. | 13915. | 1.481144 | 0.093950 | 0.954427 | 2.8948 | 7.9135 |
| 85 | 0.000000 | 1.000000 | 22665. | 22665. | 1.413644 | 0.160332 | 0.000000 | 1.4136 | 6.2371 |

net reproduction rate 1.162659

net migraproduction rate 5.718589

grazarm mortality level = 71.51

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.957011 | 0.042989 | 100000. | 4299. | 4.852526 | 0.008787 | 0.976653 | 71.5067 | 71.5067 |
| 5 | 0.997178 | 0.002822 | 95701. | 270. | 4.778304 | 0.000565 | 0.997486 | 66.6141 | 69.6064 |
| 10 | 0.997793 | 0.002207 | 95431. | 211. | 4.766289 | 0.000442 | 0.997433 | 61.8358 | 64.7963 |
| 15 | 0.997072 | 0.002928 | 95220. | 279. | 4.754055 | 0.000586 | 0.996110 | 57.0695 | 59.9341 |
| 20 | 0.995146 | 0.004854 | 94942. | 461. | 4.735563 | 0.000973 | 0.993900 | 52.3155 | 55.1027 |
| 25 | 0.992649 | 0.007351 | 94481. | 695. | 4.706676 | 0.001476 | 0.993501 | 47.5799 | 50.3593 |
| 30 | 0.994358 | 0.005642 | 93786. | 529. | 4.676087 | 0.001132 | 0.990830 | 42.8732 | 45.7137 |
| 35 | 0.987282 | 0.012718 | 93257. | 1186. | 4.633208 | 0.002560 | 0.986570 | 38.1971 | 40.9589 |
| 40 | 0.985849 | 0.014151 | 92071. | 1303. | 4.570985 | 0.002850 | 0.976547 | 33.5639 | 36.4544 |
| 45 | 0.967111 | 0.032889 | 90768. | 2985. | 4.463781 | 0.006668 | 0.959934 | 28.9930 | 31.9417 |
| 50 | 0.952513 | 0.047487 | 87783. | 4169. | 4.264936 | 0.009726 | 0.954746 | 24.5292 | 27.9430 |
| 55 | 0.957090 | 0.042910 | 83614. | 3588. | 4.091025 | 0.008770 | 0.942717 | 20.2442 | 24.2114 |
| 60 | 0.927699 | 0.072301 | 80027. | 5786. | 3.856678 | 0.015003 | 0.910554 | 16.1532 | 20.1848 |
| 65 | 0.892073 | 0.107927 | 74241. | 8013. | 3.511715 | 0.022817 | 0.865716 | 12.2965 | 16.5631 |
| 70 | 0.836171 | 0.163829 | 66228. | 10850. | 3.040149 | 0.035689 | 0.793365 | 8.7848 | 13.2645 |
| 75 | 0.742173 | 0.257827 | 55378. | 14278. | 2.411948 | 0.059197 | 0.693762 | 5.7447 | 10.3736 |
| 80 | 0.628534 | 0.371466 | 41100. | 15267. | 1.673319 | 0.091239 | 0.991682 | 3.3327 | 8.1088 |
| 85 | 0.000000 | 1.000000 | 25833. | 25833. | 1.659401 | 0.155675 | 0.000000 | 1.6594 | 6.4236 |

net reproduction rate 1.365320

net migraproduction rate 2.515664

mortality level = 71.70

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.977302 | 0.022698 | 100000. | 2270. | 4.943254 | 0.004592 | 0.987607 | 71.7032 | 71.7032 |
| 5 | 0.998151 | 0.001849 | 97730. | 181. | 4.881992 | 0.000370 | 0.998194 | 66.7599 | 68.3105 |
| 10 | 0.998237 | 0.001763 | 97549. | 172. | 4.873174 | 0.000353 | 0.996917 | 61.8780 | 63.4324 |
| 15 | 0.995596 | 0.004404 | 97377. | 429. | 4.858152 | 0.000883 | 0.994442 | 57.0048 | 58.5400 |
| 20 | 0.993283 | 0.006717 | 96949. | 651. | 4.831150 | 0.001348 | 0.992427 | 52.1466 | 53.7879 |
| 25 | 0.991565 | 0.008435 | 96297. | 812. | 4.794563 | 0.001694 | 0.990784 | 47.3155 | 49.1347 |
| 30 | 0.989996 | 0.010004 | 95485. | 955. | 4.750375 | 0.002011 | 0.987334 | 42.5209 | 44.5315 |
| 35 | 0.984646 | 0.015354 | 94530. | 1451. | 4.690209 | 0.003095 | 0.982597 | 37.7705 | 39.9562 |
| 40 | 0.980517 | 0.019483 | 93078. | 1813. | 4.608588 | 0.003935 | 0.973751 | 33.0803 | 35.5403 |
| 45 | 0.966850 | 0.033150 | 91265. | 3025. | 4.487617 | 0.006742 | 0.957207 | 28.4717 | 31.1968 |
| 50 | 0.947232 | 0.052768 | 88240. | 4656. | 4.295576 | 0.010840 | 0.949954 | 23.9841 | 27.1807 |
| 55 | 0.952827 | 0.047173 | 83583. | 3943. | 4.080598 | 0.009662 | 0.942494 | 19.6886 | 23.5556 |
| 60 | 0.931649 | 0.068351 | 79641. | 5444. | 3.845939 | 0.014154 | 0.911116 | 15.6080 | 19.5980 |
| 65 | 0.889076 | 0.110924 | 74197. | 8230. | 3.504095 | 0.023487 | 0.857187 | 11.7620 | 15.8524 |
| 70 | 0.821319 | 0.178681 | 65967. | 11787. | 3.003664 | 0.039242 | 0.775650 | 8.2579 | 12.5183 |
| 75 | 0.720047 | 0.279953 | 54180. | 15168. | 2.329793 | 0.065104 | 0.669348 | 5.2543 | 9.6978 |
| 80 | 0.598937 | 0.401063 | 39012. | 15646. | 1.559442 | 0.100332 | 0.875325 | 2.9245 | 7.4963 |
| 85 | 0.000000 | 1.000000 | 23366. | 23366. | 1.365019 | 0.171175 | 0.000000 | 1.3650 | 5.8420 |

net reproduction rate 0.925900

net migraproduction rate 4.481336

rural mortality level = 68.23

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.953431 | 0.046569 | 100000. | 4657. | 4.883578 | 0.009536 | 0.974422 | 68.2348 | 68.2348 |
| 5 | 0.996439 | 0.003561 | 95343. | 340. | 4.758667 | 0.000714 | 0.996155 | 63.3513 | 66.4455 |
| 10 | 0.997073 | 0.002927 | 95004. | 278. | 4.743226 | 0.000586 | 0.994516 | 58.5926 | 61.6741 |
| 15 | 0.992753 | 0.007247 | 94725. | 686. | 4.719112 | 0.001455 | 0.989135 | 53.8494 | 56.8478 |
| 20 | 0.985489 | 0.014511 | 94039. | 1365. | 4.667837 | 0.002923 | 0.984924 | 49.1302 | 52.2445 |
| 25 | 0.984351 | 0.015649 | 92674. | 1450. | 4.597466 | 0.003155 | 0.985830 | 44.4624 | 47.9770 |
| 30 | 0.987332 | 0.012668 | 91224. | 1156. | 4.532318 | 0.002550 | 0.981066 | 39.8649 | 43.7000 |
| 35 | 0.974720 | 0.025280 | 90069. | 2277. | 4.446502 | 0.005121 | 0.974817 | 35.3326 | 39.2286 |
| 40 | 0.974916 | 0.025084 | 87792. | 2202. | 4.334524 | 0.005081 | 0.964832 | 30.8861 | 35.1812 |
| 45 | 0.954489 | 0.045511 | 85589. | 3895. | 4.182086 | 0.009314 | 0.948342 | 26.5516 | 31.0221 |
| 50 | 0.941902 | 0.058098 | 81694. | 4746. | 3.966048 | 0.011967 | 0.948243 | 22.3695 | 27.3820 |
| 55 | 0.954976 | 0.045024 | 76948. | 3465. | 3.760778 | 0.009212 | 0.944291 | 18.4035 | 23.9168 |
| 60 | 0.933103 | 0.066897 | 73483. | 4916. | 3.551270 | 0.013842 | 0.917232 | 14.6427 | 19.9266 |
| 65 | 0.900223 | 0.099777 | 68567. | 6841. | 3.257337 | 0.021003 | 0.864569 | 11.0914 | 16.1759 |
| 70 | 0.824963 | 0.175037 | 61726. | 10804. | 2.816192 | 0.038365 | 0.779986 | 7.8341 | 12.6917 |
| 75 | 0.725465 | 0.274535 | 50922. | 13980. | 2.196589 | 0.063643 | 0.675301 | 5.0179 | 9.8541 |
| 80 | 0.606155 | 0.393845 | 36942. | 14549. | 1.483359 | 0.098084 | 0.901968 | 2.8213 | 7.6371 |
| 85 | 0.000000 | 1.000000 | 22392. | 22392. | 1.337942 | 0.167365 | 0.000000 | 1.3379 | 5.9750 |

net reproduction rate 1.731708

net migraproduction rate 5.061444

APPENDIX D *Continued.*

urban mortality level = 69.90

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.958753 | 0.041247 | 100000. | 4125. | 4.896882 | 0.008423 | 0.977554 | 69.9038 | 69.9038 |
| 5 | 0.997164 | 0.002836 | 95875. | 272. | 4.786967 | 0.000568 | 0.997392 | 65.0069 | 67.8036 |
| 10 | 0.997620 | 0.002380 | 95603. | 228. | 4.774480 | 0.000477 | 0.996682 | 60.2200 | 62.9894 |
| 15 | 0.995742 | 0.004258 | 95376. | 406. | 4.758639 | 0.000853 | 0.994279 | 55.4455 | 58.1337 |
| 20 | 0.992810 | 0.007190 | 94970. | 683. | 4.731417 | 0.001443 | 0.990895 | 50.6869 | 53.3716 |
| 25 | 0.988965 | 0.011035 | 94287. | 1040. | 4.688335 | 0.002219 | 0.990146 | 45.9554 | 48.7400 |
| 30 | 0.991340 | 0.008660 | 93246. | 807. | 4.642137 | 0.001740 | 0.985972 | 41.2671 | 44.2559 |
| 35 | 0.980558 | 0.019442 | 92439. | 1797. | 4.577019 | 0.003927 | 0.980793 | 36.6250 | 39.6207 |
| 40 | 0.981034 | 0.018966 | 90642. | 1719. | 4.489110 | 0.003830 | 0.971373 | 32.0480 | 35.3567 |
| 45 | 0.961526 | 0.038474 | 88923. | 3421. | 4.360600 | 0.007846 | 0.955665 | 27.5588 | 30.9919 |
| 50 | 0.949570 | 0.050430 | 85501. | 4312. | 4.167273 | 0.010347 | 0.951156 | 23.1982 | 27.1320 |
| 55 | 0.952826 | 0.047174 | 81190. | 3830. | 3.963725 | 0.009663 | 0.939082 | 19.0310 | 23.4402 |
| 60 | 0.924657 | 0.075343 | 77359. | 5828. | 3.722262 | 0.015658 | 0.903933 | 15.0672 | 19.4769 |
| 65 | 0.881520 | 0.118480 | 71531. | 8475. | 3.364677 | 0.025188 | 0.854675 | 11.3450 | 15.8602 |
| 70 | 0.824221 | 0.175779 | 63056. | 11084. | 2.875705 | 0.038543 | 0.779103 | 7.9803 | 12.6559 |
| 75 | 0.724362 | 0.275638 | 51972. | 14325. | 2.240471 | 0.063940 | 0.674088 | 5.1046 | 9.8218 |
| 80 | 0.604682 | 0.395318 | 37647. | 14882. | 1.510274 | 0.098541 | 0.896427 | 2.8641 | 7.6079 |
| 85 | 0.408092 | 0.591908 | 22764. | 13474. | 1.353850 | 0.168145 | 0.000000 | 1.3539 | 5.9473 |

net reproduction rate 1.020133

net migraproduction rate 4.670945

ussr mortality level = 69.32

| age | p(x) | q(x) | l(x) | d(x) | ll(x) | m(x) | s(x) | t(x) | e(x) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.956214 | 0.043786 | 100000. | 4379. | 4.890535 | 0.008953 | 0.976054 | 69.3196 | 69.3196 |
| 5 | 0.996803 | 0.003197 | 95621. | 306. | 4.773428 | 0.000640 | 0.997077 | 64.4291 | 67.3793 |
| 10 | 0.997352 | 0.002648 | 95316. | 252. | 4.759475 | 0.000530 | 0.996018 | 59.6556 | 62.5874 |
| 15 | 0.994681 | 0.005319 | 95063. | 506. | 4.740525 | 0.001067 | 0.992780 | 54.8962 | 57.7470 |
| 20 | 0.990868 | 0.009132 | 94558. | 863. | 4.706298 | 0.001835 | 0.989213 | 50.1556 | 53.0424 |
| 25 | 0.987542 | 0.012458 | 93694. | 1167. | 4.655531 | 0.002507 | 0.988767 | 45.4493 | 48.5082 |
| 30 | 0.990008 | 0.009992 | 92527. | 925. | 4.603237 | 0.002008 | 0.984249 | 40.7938 | 44.0886 |
| 35 | 0.978431 | 0.021569 | 91602. | 1976. | 4.530729 | 0.004361 | 0.978579 | 36.1906 | 39.5083 |
| 40 | 0.978731 | 0.021269 | 89627. | 1906. | 4.433677 | 0.004300 | 0.968921 | 31.6599 | 35.3241 |
| 45 | 0.958898 | 0.041102 | 87720. | 3605. | 4.295882 | 0.008393 | 0.952901 | 27.2262 | 31.0375 |
| 50 | 0.946648 | 0.053352 | 84115. | 4488. | 4.093551 | 0.010963 | 0.950075 | 22.9303 | 27.2607 |
| 55 | 0.953696 | 0.046304 | 79627. | 3687. | 3.889182 | 0.009480 | 0.941342 | 18.8367 | 23.6562 |
| 60 | 0.928387 | 0.071613 | 75940. | 5438. | 3.661049 | 0.014854 | 0.910046 | 14.9476 | 19.6833 |
| 65 | 0.890289 | 0.109711 | 70502. | 7735. | 3.331723 | 0.023216 | 0.859345 | 11.2865 | 16.0088 |
| 70 | 0.824587 | 0.175413 | 62767. | 11010. | 2.863099 | 0.038455 | 0.779538 | 7.9548 | 12.6735 |
| 75 | 0.724906 | 0.275094 | 51757. | 14238. | 2.231894 | 0.063793 | 0.674685 | 5.0917 | 9.8377 |
| 80 | 0.605407 | 0.394593 | 37519. | 14805. | 1.505826 | 0.098316 | 0.899152 | 2.8598 | 7.6223 |
| 85 | 0.000000 | 1.000000 | 22714. | 22714. | 1.353966 | 0.167760 | 0.000000 | 1.3540 | 5.9609 |

net reproduction rate 1.241681

net migraproduction rate 4.695543

## RELATED PUBLICATIONS OF THE MIGRATION AND SETTLEMENT TASK

THEORY AND MODELS

| | |
|---|---|
| Migration and Settlement: Selected Essays<br>(Reprinted from a Special Issue of Environment and Planning A)<br>Andrei Rogers (Editor) | RR-78-6 |
| Migration and Settlement: Measurement and Analysis<br>Andrei Rogers and Frans Willekens | RR-78-13 |
| Spatial Population Analysis: Methods and Computer Programs<br>Frans Willekens and Andrei Rogers | RR-78-18 |
| Migration Patterns and Population Redistribution<br>(Reprinted from Regional Science and Urban Economics)<br>Andrei Rogers | RR-80-7 |
| Essays in Multistate Demography<br>(Reprinted from a Special Issue of Environment and Planning A)<br>Andrei Rogers (Editor) | RR-80-10 |

NATIONAL CASE STUDIES

| | |
|---|---|
| Migration and Settlement: 1. United Kingdom<br>Philip Rees | RR-79-3 |
| Migration and Settlement: 2. Finland<br>Kalevi Rikkinen | RR-79-9 |
| Migration and Settlement: 3. Sweden<br>Åke Andersson and Ingvar Holmberg | RR-80-5 |
| Migration and Settlement: 4. German Democratic Republic<br>Gerhard Mohs | RR-80-6 |
| Migration and Settlement: 5. Netherlands<br>Paul Drewe | RR-80-13 |
| Migration and Settlement: 6. Canada<br>Marc G. Termote | RR-80-29 |
| Migration and Settlement: 7. Hungary<br>Klára Bies and Kálmán Tekse | RR-80-34 |

## THE AUTHOR

*S. Soboleva* joined the HSS Area from the Institute of Economics and Industrial Engineering, Siberian Branch of the USSR Academy of Sciences, Novosibirsk, where she received her Ph.D. in 1973. Dr. Soboleva's scientific interests include the study of demographic processes such as migration, the influence of socioeconomic factors on demographic processes, and methodological problems of modeling. She has published several papers on mathematics, demography, and demographic mathematical modeling and has participated in international workshops.