8 Famine losses in Ukraine in 1932 to 1933 within the context of the Soviet Union

Omelian Rudnytskyi, Nataliia Levchuk, Oleh Wolowyna and Pavlo Shevchuk

Introduction

Although the 1932/1933 famine in the Union of Soviet Socialist Republics (USSR) was one of the largest European catastrophes of the twentieth century, its magnitude is still not widely known. For many years, the Soviet government tried to minimise its scope and blame it on natural causes. The famine’s occurrence and its man-made nature are now generally accepted facts. However, one issue still in dispute is the level of population losses due to the famine experienced in different regions of the Soviet Union. This is especially the case for Ukraine, where estimates of excess famine deaths vary between 2.6 and 5.0 million. To illustrate the difficulty of the task, the estimates of one researcher, Maksudov, have varied from one attempt to the next: 4.4 million and then 3.6 million.

One reason for these variations is the earlier limited access to relevant data, forcing researchers to use methods based on assumptions that were difficult to verify. Initial estimates were based on general demographic indicators and historical documents, as well as on the demographic balance method. Once data from the 1926, 1937 and 1939 Soviet censuses and the time series of vital statistics and migration data became fully accessible, researchers were able to apply the more effective population reconstruction method that allows for estimating direct (excess deaths), indirect (lost births) and migration losses by year, sex and age. Full population reconstructions were done by Andreev et al. for the Soviet Union as a whole in 1920 to 1959 and the Russian Soviet Federative Socialist Republic in 1927 to 1958, and by Vallin et al. and Mesle et al. for the Ukrainian Soviet Socialist Republic in 1927 to 1958. Another reason for variation in estimates is the confounding effect of migration. If net migration for a republic or region is measured incorrectly, the population change attributed to excess deaths may be over- or underestimated. A third reason is that many of the official statistics have serious data quality problems, and their use without relevant adjustments is likely to introduce significant biases in the loss estimates.

The 1932/1933 famine affected different regions of the Soviet Union, and previous research on famine losses focused mainly on the Soviet Union as a whole and on specific republics: Russia, Ukraine and Kazakhstan. Up until now no attempt has been made to estimate famine losses in all former Soviet...
republics and evaluate losses in Ukraine in comparison to the other republics. Our results are based on population reconstructions for all 11 former Soviet republics and the Prydnistrovia (Transdnister) region, after the quality of all data was carefully evaluated and relevant adjustments were made where needed.

Data

All the Soviet republics were analysed within their current international borders and original data were recalculated to conform to these territorial definitions because: (1) during the 1926 to 1939 intercensal period several Soviet republics underwent significant border changes, and borders in 1926 are not consistent with borders in 1939; (2) our reconstruction of Russia is based on the work of Andreev et al. and they used Russia within its current borders; (3) this is consistent with common statistical practice, where analysis of data from previous censuses is made consistent with data from the latest census.6

Ukraine includes 17 of the current oblasts and the Autonomous Republic of Crimea, as well as the seven western oblasts and the southwestern part of the Odesa oblast that were not part of the Ukrainian Soviet Socialist Republic (UkrSSR) during the 1927 to 1938 period. Also excluded from Ukraine is the region of Prydnistrovia, which belonged to the UkrSSR in 1924 to 1940 and became part of Moldova in 1940. Belarus is analysed within its 17 September 1939 borders; that is, without western Belarus. Russia is defined as it existed within its 1939 borders, excluding Crimea, and all the other republics are analysed within their current borders. In order to simplify the presentation of results for 11 republics and one region, the seven Asian republics are aggregated into two regions: Transcaucasus (Armenia, Georgia and Azerbaijan) and Central Asia (Uzbekistan, Kyrgyzstan, Turkmenistan and Tajikistan), as results for the republics in each of these two regions are fairly similar. Thus, although analyses were performed for each individual republic, the results are presented for the USSR as a whole, and the seven regions of Russia, Ukraine, Prydnistrovia, Belarus, Kazakhstan, Central Asia and Transcaucasus.

One of the challenges for a comprehensive analysis of the USSR and its republics is the unevenness of available demographic data in terms of existence, completeness and quality. A detailed summary of birth, death and migration data availability by country and region is presented in Table 8.1. The Soviet censuses of 1926 and 1939 provide the necessary population information by age, sex and ethnicity, although they require adjustments (see below). Complete annual migration data are available only for the urban populations of all republics. Vital statistics range from very complete for Ukraine to very limited for Kazakhstan and Central Asia. In the case of Ukraine, access was gained to the research manuscripts of the Ukrainian demographer Yurii Korchak-Chepurkovskiy (archives of Korchak-Chepurkovskiy), which allowed us to complete the time series of vital statistics for the 1930 to 1932 period, since the original data were destroyed.7 In order to take advantage of data that were only available for urban and/or rural areas, all analysis was done by urban-rural areas for each republic and then aggregated on the national level.
Table 8.1 Summary of available Soviet birth, death and migration data, 1926 to 1939

<table>
<thead>
<tr>
<th>Data</th>
<th>USS</th>
<th>Belarus</th>
<th>Transcaucasus</th>
<th>Kazakhstan</th>
<th>Russia</th>
<th>Central Asia</th>
<th>Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Births:</strong></td>
<td></td>
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<tr>
<td>Total</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
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<td>Yearly</td>
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<tr>
<td>Estimated totals</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
</tr>
<tr>
<td>By urban-rural</td>
<td>Yearly(^1)</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
</tr>
<tr>
<td>By age of mother</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
</tr>
<tr>
<td>By nationalities</td>
<td>1926, 1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
</tr>
<tr>
<td>By age of mother and nationalities</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
</tr>
<tr>
<td>By age of mother(^1) (indirect estimation)</td>
<td>NA</td>
<td>NA</td>
<td>Yearly</td>
<td>Yearly</td>
<td>NA</td>
<td>Yearly</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Deaths:</strong></td>
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<tr>
<td>Total</td>
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<td>Yearly</td>
</tr>
<tr>
<td>Estimated totals</td>
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<td>Yearly</td>
<td>Yearly</td>
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<td>Yearly</td>
<td>Yearly</td>
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<tr>
<td>By urban-rural</td>
<td>Yearly(^1)</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
</tr>
<tr>
<td>By age and sex</td>
<td>1939</td>
<td>1926, 1939</td>
<td>1926, 1939</td>
<td>1939</td>
<td>1926, 1939</td>
<td>1939</td>
<td>1939</td>
</tr>
<tr>
<td>By nationalities</td>
<td>1926, 1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
<td>1939</td>
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<tr>
<td><strong>Life tables:</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Calculated by authors and different researchers</td>
<td>1926–1927 (Europe part)</td>
<td>1926–1927 (Europe part)</td>
<td>1926–1927 (Europe part)</td>
<td>1926–1927</td>
<td>1938–1939(^6)</td>
<td>1924–1931(^7)</td>
<td></td>
</tr>
<tr>
<td>Migration:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban migration by origin: destination, age-sex</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
</tr>
<tr>
<td>Migration of special groups</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
<td>Yearly</td>
</tr>
</tbody>
</table>
Adjustment of census data

The 1926 and 1939 censuses have problems typical of most censuses at that time, and the results of the 1939 census were also affected by deliberate falsifications by the Soviet government, which attempted to hide the effects of the 1932/1933 famine and political repressions in 1937/1938. Detailed adjustments were made to correct these problems.

Adjustments of the 1926 census consisted of: (1) the redistribution of military and border personnel to different republics (to align the de jure 1926 data with the de facto 1939 census data); (2) adjustment for significant undercounting of women aged eight to 27 in republics with large Muslim populations and of children aged 0 to two in all republics; (3) redistribution of persons with unknown age; and (4) application of smoothing techniques to address serious digit preference problems. These modifications increased the overall USSR population by 1.1 per cent, by less than 1.0 per cent for the European republics and between 2.4 and 3.0 per cent for Kazakhstan, Transcaucasus and Central Asia (Table 8.2).

The 1939 census was falsified in three major ways. First, individual records of special populations – armed forces, secret police, prisoners in concentration camps, civilian support populations in the camps – were reassigned during data processing to other republics in order to hide their large concentrations in northern and eastern Russia and Kazakhstan. Second, the number of persons captured in control forms and presumably not registered by the census was artificially inflated. Third, the size of the census undercount was greatly exaggerated. These falsifications are well documented in official documents, which provide information that may be used to adjust the census figures. Andreev et al., Zhiromskaia, and Tolts describe in detail the official communications between the Central Statistical Board and Communist Party General Secretary Joseph Stalin and Soviet Council of Ministers First Deputy Chairman Vyacheslav Molotov, confirming political reasons for these falsifications; they also provide descriptions of irregularities in processing the census data.

Table 8.2 Official and adjusted total populations from the 1926 and 1939 Soviet censuses (in 1,000s): USSR and seven regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Official 1926</th>
<th>Official 1939</th>
<th>Adjusted 1926</th>
<th>Adjusted 1939</th>
<th>% adjustment 1926</th>
<th>% adjustment 1939</th>
</tr>
</thead>
<tbody>
<tr>
<td>USSR</td>
<td>147,027.9</td>
<td>170,557.1</td>
<td>148,583.0</td>
<td>168,870.9</td>
<td>1.1</td>
<td>-1.0</td>
</tr>
<tr>
<td>Belarus</td>
<td>4,986.0</td>
<td>5,571.2</td>
<td>4,984.5</td>
<td>5,444.0</td>
<td>0.0</td>
<td>-2.3</td>
</tr>
<tr>
<td>Transcaucasus</td>
<td>5,872.2</td>
<td>8,026.6</td>
<td>6,015.5</td>
<td>8,023.2</td>
<td>2.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>6,025.1</td>
<td>6,081.6</td>
<td>6,160.8</td>
<td>5,489.9</td>
<td>2.3</td>
<td>-9.7</td>
</tr>
<tr>
<td>Russia</td>
<td>92,734.4</td>
<td>108,262.0</td>
<td>93,493.4</td>
<td>108,027.6</td>
<td>0.8</td>
<td>-0.2</td>
</tr>
<tr>
<td>Central Asia</td>
<td>7,653.1</td>
<td>10,542.6</td>
<td>7,885.1</td>
<td>10,634.2</td>
<td>3.0</td>
<td>0.9</td>
</tr>
<tr>
<td>Ukraine</td>
<td>29,515.1</td>
<td>31,785.4</td>
<td>29,800.4</td>
<td>30,966.9</td>
<td>1.0</td>
<td>-2.6</td>
</tr>
<tr>
<td>Prydnistrovia</td>
<td>242.0</td>
<td>287.7</td>
<td>243.3</td>
<td>285.1</td>
<td>0.5</td>
<td>-0.9</td>
</tr>
</tbody>
</table>

Source: calculations based on the 1926 and 1939 censuses, multiple studies.
Adjustment of the 1939 census was performed in two stages: adjustment of total populations and of age–sex structures. First, taking as the basis the original count of the civilian population, the special subpopulations were added to the original count, and then adjustments were made to reduce the overestimation of control forms, undercounting and the so-called ‘unknown difference’. Then the age–sex structure of the civilian population was adjusted to the new totals, taking into account the very different age–sex structure of prisoners and resettled kulaks. The category ‘age unknown’ was distributed proportionally to the adjusted age–sex structure, and the same methods applied in the 1926 census were used to smooth out age heaping. After all the adjustments were made, the populations in both censuses were shifted to 1 January of the year closest to the census data, to align them for the reconstruction process (a more detailed and technical description of the 1926 and 1939 census adjustments is provided in the appendix).

These adjustments decrease the 1939 census USSR population by 1 per cent. Kazakhstan’s population is reduced by close to 10 per cent, and Ukraine’s and Belarus’ by 2.3 per cent. The population of the Transcaucasus region was unchanged and Central Asia’s population increased by almost 1 per cent (Table 8.2).

Reconstruction of natural growth and migration

Reconstructed populations are populations that reflect the actual demographic situation, i.e. they are calculated for a certain period using the demographic balancing equation (1) with adjusted initial population and yearly adjusted numbers of births, deaths and net migrants (difference between in- and out-migrants). The following general steps were used in the population reconstruction process:

- All official statistics were evaluated for errors and falsifications, with appropriate adjustments made.
- The adjusted 1926 and 1939 census populations were used as pillars for the yearly reconstructions.
- During this 12-year period. (The 1937 census population was used only as a standard for the reconstructed total population values for 1937, as data by age at the republic level were not reported in this census.)
- Adjusted (reconstructed) total numbers of births, deaths and net migrants for each country or region.
- Figures for the 1927 to 1939 period were estimated, and these values were disaggregated by year.
- Yearly population balances for the USSR and each republic or region were calculated using the following demographic balancing equation:

\[ P(t+1) = P(t) + B(t, t+1) - D(t, t+1) + \Delta M(t, t+1) \]
where:

\[ P(t) \] – population at the beginning of year \( t \)
\[ B(t, t+1) \] – number of live births during year \( t \)
\[ D(t, t+1) \] – number of deaths during year \( t \)
\[ \Delta M(t, t+1) \] – number of net migrants during year \( t \).

- Age structures for these births, deaths and net migrants were estimated (detailed below).
- Starting with the adjusted age–sex populations of the 1926 census, yearly reconstructed populations by age and sex were calculated using the demographic balancing equation (1), with each term specified by age and sex.

These reconstructed populations provide the basis for estimating direct and indirect losses during the 1932/1933 famine.

Under-registration of births and deaths is a common characteristic of many vital statistics registration systems. Given the wide variation of vital statistics data availability in the different Soviet republics, it was necessary to develop different adjustment methodologies in each case. The methods used are a combination of results from previous research, empirically validated relationships, demographic models, informed assumptions and use of the demographic balancing equation. Under-registration of births and deaths was particularly severe in 1933, the year when most famine-related deaths occurred. The extraordinary increase in deaths during the first half of 1933 caused severe disruptions in the vital statistics registration system and resulted in very high levels of under-registration. Thus, in most cases two different adjustment methods were used: one for 1933 and another for all the other years (1927–1932 and 1934–1938).

**USSR**

The estimation of adjusted numbers of births and deaths for the 12-year period was based on estimates derived by Andreev *et al.*\(^{11}\) Adjustments to these estimates were made to account for the adjusted values of the 1926 and 1937 census populations and a different estimate of net migration: \(-400,000\) instead of the \(-200,000\) estimated by Andreev *et al.* Analysis of available data on migration showed that during the first half of the 1930s, besides the 200,000 migrants from Kazakhstan, there was also emigration from other Central Asian republics: 100,000 from Turkmenistan and 100,000 from Uzbekistan and Tajikistan\(^{12}\). According to these researchers, the yearly distribution of these \(-400,000\) net migrants was: \(-50,000\) in 1930, \(-50,000\) in 1931, \(-100,000\) in 1932 and \(-200,000\) in 1933. For the other years, net migration for the USSR was zero.\(^{13}\)

These census and migration adjustments resulted in 347,800 more births and 29,600 fewer deaths than estimated by Andreev *et al.* for this period, with a total of 74,386,800 reconstructed births and 53,940,400 reconstructed deaths for the 12-year period. The yearly distribution of these totals was done by applying yearly proportions of births and deaths estimated by Andreev *et al.*\(^{14}\)
O. Rudnytskyi et al.

Ukraine (and Prydnistrovia)

Adjustment of infant deaths: Infant deaths were adjusted for using the method developed by Arsenii Khomenko, which is based on the following assumptions: (1) under-reporting of infant deaths was concentrated mainly in the first six months of life; (2) adjustment factors may be estimated based on a relationship with a referent country with an infant mortality regime similar to Ukraine’s but with better quality statistics, like Hungary; (3) the ratio of infant mortality during the first six months of life in Ukraine and Hungary is equal to the respective ratio of infant mortality during the second half of the first year of life. We adjusted the infant mortality rate for Ukraine during the first six months of life by multiplying the Hungarian infant mortality rate during the first six months of life by the ratio of the Ukrainian infant mortality rate during the sixth to eleventh months of life and the respective infant mortality rates for Hungary. Adjusted rates were calculated for 1926/1927 (30%) and 1938/1939 (10%) and interpolated linearly between these two years, except for 1933. The number of infant deaths for each year (except 1933) was obtained as the product of the number of registered births and the sum of the adjusted infant mortality rates for the first and second half of the year.

For 1933, the number of adjusted infant deaths was obtained as the sum of the registered number of infant deaths and one-half of the difference between the number of adjusted and registered births in 1933. This adjustment factor was derived by comparing the number of births in 1933 to the number of their survivors six years later in the 1939 census. The same method was applied to adjust urban and rural infant deaths.

Adjustment of births: Based on the assumption that the number of under-registered births is equal to the number of under-registered infant deaths, the number of adjusted births was calculated as the number of registered births plus the number of under-registered infant deaths for the first six months. The adjustment factors are 4.4 per cent in 1927 and 1.4 per cent in 1938, and these factors were interpolated linearly for the interim years, except for 1933. For 1933, we extrapolated the previous trend of declining fertility by estimating the number of adjusted births in 1933 as the number of registered births in 1932 times the ratio of adjusted births for 1932 and 1931. The same method was applied to adjust urban and rural births.

Adjustment of deaths aged 1 year or more: Research by the Central Statistical Department of the UkrSSR showed that the under-registration adjustment factor for infant deaths was 2.5 times the under-registration factor for deaths at one year or older. We used this relationship to obtain the adjusted number of deaths at one year or older for all years for a whole country and its urban areas, using the following steps. First, deaths for the whole country and all years except 1933 were estimated using this adjustment factor. Second, for urban deaths the same method was used for all years including 1933. Third, rural deaths were calculated for all years except 1933 as the difference between total and urban deaths. Adjustment of rural deaths in 1933 requires
special treatment (described below). The sum of rural and urban deaths in 1933 completes the time series for all deaths.

The number of deaths for 1933 in rural areas was obtained using the demographic balance equation. This requires the estimation of net migration for rural areas for the 12-year period, which is described in the next section. We calculated the adjusted natural growth for 1933 as the total growth for 12 years minus net migration for 12 years and minus the sum of natural growth for 11 years (excluding 1933). Having the adjusted natural growth and adjusted births for 1933, we can calculate the adjusted number of deaths in 1933. For 1933 the adjustment factors for all deaths are 2.18 for the whole country, 2.33 for rural areas and 1.14 for urban areas.

**Estimation of net migration:** In urban areas net migration (including rural to urban reclassification) for the 12-year period was calculated as the difference between total and natural growth, resulting in 4,995,920 persons, which includes 1,800,000 persons due to reclassification. Of the remaining 3,195,920 net migrants for urban areas, 82 per cent were net migrants from rural areas in Ukraine, and 18 per cent were net migrants from other Soviet republics.22 Details statistics are available on different migration streams for rural areas: (1) 700,000 voluntary migrants, Gulag prisoners, and those exiled during the 1927 to 1938 period;23 (2) 300,000 deported kulaks (alleged rich farmers) during 1930 to 1933;24 (3) 40,000 deported Germans and Poles to Kazakhstan;25 (4) resettlement of peasants from Russia and Belarus to rural areas in Ukraine depopulated by the 1932/1933 famine: 118,400 in 1933 and 19,100 in 1934.26 The sum of all internal and external migration streams and the reclassification component resulted in a 5,321,888 net loss for rural areas in Ukraine during the 12-year period, within a net loss of 325,968 migrants for the whole country during the 1927 to 1938 period. According to official statistics, net migration for Ukraine for the 1927 to 1929 period was zero (TSU USRR, 1927–1932). For the other years, annual net migration in rural areas was obtained from the registration system in urban areas (rural to urban migration) and statistics for the different migration streams for rural areas listed above.

**Belarus**

The methods used for Ukraine were applied to the reconstruction of yearly births and deaths for Belarus with the exception of deaths in 1932 and 1933.27 The yearly under-registration of deaths before 1932 was estimated at about 25 per cent. Due to lack of data, it was assumed that during the crisis years of 1932 and 1933, registered deaths were underestimated by 50 per cent. Urban births and deaths were also adjusted using the same methods as for Ukraine. Rural births and deaths were obtained as the difference between total and urban values. Net migration for the 1927 to 1938 period for the whole country was calculated as the difference between total and natural growth for this period. Yearly disaggregation of migrants was done by applying yearly proportions of migrants as estimated by Rakov and Maskov.28 For urban areas, we
have yearly estimates of urban net migrants from the registration system, while yearly numbers of net migrants in rural areas is the difference between total and urban net migrants.\(^{29}\)

**Kazakhstan, Transcaucasus and Central Asia**

**Migration:** Net migration was estimated using the ethnodemographic balance (EDB) method, which was successfully applied by several researchers.\(^{30}\) This approach is based on the assumption that changes in ethnic identification from one census to the next in these Asian republics did not usually cross the European/non-European divide. A self-declared member of one of the European nationalities at the first census was unlikely to choose a non-European nationality at the second census; likewise a member of a non-European nationality would rarely report a European nationality in the second census.\(^{31}\)

We start by estimating the intercensal natural rates of growth for European and non-European subpopulations in each republic. For the European nationalities, we input the average natural rate of growth of the urban population of the USSR during 1927 to 1938 to each of these three regions, as most people of European nationality resided in the cities. The 1 January 1927 European subpopulation in each region was multiplied by this rate – 9 per 1,000 population – resulting in the expected population on 1 January 1939 had there been zero net migration. The difference between this estimate and the 1939 census of the European subpopulation gives an estimate of its net migration. The yearly disaggregation of this net migration was calculated proportionally to the urban net migration for each of the three regions.\(^{32}\)

For non-European nationalities, we calculate the rate of change between 1927 and 1938 of the titular ethnic group of each of the republics in these three regions (Kazakhs in Kazakhstan, Uzbeks in Uzbekistan, etc.) and then apply these rates to the respective non-European nationality in the eight republics (the rate of change for Kazakhs in Kazakhstan to Kazakhs in all of the republics, excluding Kazakhstan; the rate of change for Uzbeks in Uzbekistan to Uzbeks in all of the republics, excluding Uzbekistan, etc.). The sum of all of these non-European nationalities in each republic gives us the expected number of non-Europeans in each republic in 1939, assuming zero net migration. The yearly disaggregation of these estimates was done in three steps: (1) we calculated the total number of net urban migrants for these eight republics as the difference of the urban net migrants for the USSR and all the European republics; (2) the total number of intercensal non-European net migrants in each of the eight republics was disaggregated according to the yearly proportions of urban net migrants in these republics as a unit, and (3) we also took into account yearly statistics of forced migrants in these republics.\(^{33}\)

**Births:** The number of yearly births for rural populations was estimated by multiplying the age-specific birth rate (estimated by Korchak-Chepurkivskiy and Sifman), and by the number of women in the respective age groups.\(^{34}\) The yearly number of women at childbearing age for the eight republics was
estimated using survivorship ratios based on probabilities of dying interpolated linearly between the 1926 and 1939 values. For urban populations, yearly numbers of births for all eight republics as a unit were calculated as the difference between respective births for the USSR and all the European republics. Official estimates of urban births for each republic are available for 1926 and 1939, and these estimates were adjusted to the totals of the eight republics for these years.35 The number of births for the intercensal period for each republic was estimated by multiplying the average general fertility rates for urban populations, based on 1926 and 1939 data for each republic, by the average number of women aged 15 to 49. The yearly disaggregation of these births was calculated using yearly proportions of births for the eight republics as a unit.

Deaths: First, the total number of yearly urban deaths for the eight republics as a unit was estimated as the difference of deaths between the USSR and the European republics. The disaggregation of these urban deaths by republic was obtained as the difference between total growth and net migration and births. The yearly numbers of deaths were obtained by applying yearly proportions for the eight republics as a unit; a similar methodology was applied to estimate rural deaths.

Russia
Net migration for the 12-year period was estimated as the difference between net migration for the whole Soviet Union and net migration for all the other regions, resulting in −965,000 net migration, compared to Andreev et al.’s +450,000.36 There is no agreement among researchers on the net migration for Russia during this intercensal period. Andreev et al. and Iontsev estimated positive net migration, while Perevedentsev, Rybakovskyk, Maksudov and Simchera estimated negative net migration.37 Our estimate indicates that during this period Russia was a net exporter of population to other republics. Yearly net migration was obtained as the difference between the USSR and all other regions. Net migration for urban areas was obtained from the migration registration statistics.38 Net migration for rural areas was obtained as the difference between net migrants for all of Russia and in its urban areas.

Our estimate of natural growth for the intercensal period is 15,171,600, while the Andreev et al. estimate is 13,840,000.39 Due to lack of information, the 1,331,600 difference between these two figures was distributed equally between births and deaths: 665,800 were added to births and 665,800 were subtracted from deaths, resulting in 50,061,300 births and 34,889,700 deaths for the 12-year period. Yearly numbers of births and deaths were obtained by applying yearly proportions based on the Andreev et al. (1998) estimates of births and deaths. Estimates for urban areas were obtained by applying to official birth and death registrations respective adjustment coefficients for Ukraine’s urban population.40 Yearly numbers of births and deaths in rural areas were obtained by differences between total and urban values.
Some results from the reconstruction

The reconstruction of natural growth and migration allows us to calculate population balances that summarise the population dynamics of each region (Table 8.3). The intercensal yearly natural rate of growth (growth due to births and deaths) for the whole Soviet Union was very low (1.1%), reflecting the effects of the famine and other events during this period. Kazakhstan actually lost population at an average yearly rate of −1.0 per cent. Ukraine had the lowest positive annual rate of growth with 0.4 per cent, followed by Prydnistrovia with 1.1 per cent and Russia with 1.2 per cent. The highest rate of growth was experienced by the Transcaucasus region with 2.0 per cent, followed by Central Asia and Belarus with 1.6 per cent each. Thus, if we exclude Kazakhstan, Ukraine had the lowest rate of population growth among all Soviet republics between 1927 and 1938.

Two patterns of intercensal net migration may be observed among the different regions: European regions experienced negative net migration and Asian regions (with the exception of Kazakhstan) had positive net migration (Table 8.4). Russia had the largest number of negative net migrants with −965,000, followed by Belarus with −593,800 and Ukraine with −326,000. Central Asia gained more than one million net migrants and the Transcaucasus region almost 400,000, while Kazakhstan had zero net migration during the whole period.

An important result from the reconstruction process is the estimation of under-reporting of vital events due to problems in the registration systems in the different republics, especially during the famine years. This under-registration may be measured by comparing registered vital events in republics with functioning registration systems (Russia, Belarus and Ukraine) with their respective reconstructed values. Before the famine, Ukraine had the lowest level of under-registration of births, at about 3 per cent, followed by Belarus at 6 per cent and Russia at 16 per cent; under-registration of deaths was around 9 per cent for Ukraine, 10 per cent for Belarus and 33 per cent for Russia.

Levels of under-registration of both births and deaths experienced increases in 1932 and reached maximum values at the height of the famine in 1933. That year, under-registration of births was 13 per cent in Belarus, 23 per cent in Russia and 35.5 per cent in Ukraine, while under-registration of deaths was 50 per cent in Belarus, 80 per cent in Russia and the number of adjusted deaths was more than twice the number of registered deaths in Ukraine. These high levels of under-registration in 1933 were caused by the disruption of the social fabric in general and the vital registration system in particular due to very high mortality in an extremely short time period, and in many instances the vital statistics bureaucracy was not able to cope with the sudden increase in deaths.

The time series of reconstructed numbers of births and deaths provide an initial view of the regional variations of the impact of the 1932 to 1934 famine in the Soviet Union. Figure 8.1 shows three distinct patterns of yearly births and deaths during the intercensal period. The pattern for Ukraine, with a sudden and extremely high increase in the number of deaths and a decline in the number of
Table 8.3  Population balance for the USSR and six regions (in 1,000s), 1927 to 1938

<table>
<thead>
<tr>
<th>Region</th>
<th>Population on 1 January 1927</th>
<th>Births</th>
<th>Deaths</th>
<th>Net migration</th>
<th>Population on 1 January 1939</th>
<th>% annual natural rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>USSR</td>
<td>148,705.8</td>
<td>74,386.8</td>
<td>53,940.4</td>
<td>-400.0</td>
<td>168,752.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Belarus</td>
<td>4,988.3</td>
<td>2,177.9</td>
<td>1,132.2</td>
<td>-593.8</td>
<td>5,440.2</td>
<td>1.6</td>
</tr>
<tr>
<td>Transcaucasus</td>
<td>6,020.2</td>
<td>3,253.6</td>
<td>1,655.5</td>
<td>399.6</td>
<td>8,017.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>6,162.5</td>
<td>2,466.5</td>
<td>3,143.7</td>
<td>0.0</td>
<td>5,485.3</td>
<td>-1.0</td>
</tr>
<tr>
<td>Russia</td>
<td>93,574.1</td>
<td>50,063.5</td>
<td>34,923.1</td>
<td>-759.6</td>
<td>107,954.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Central Asia</td>
<td>7,889.6</td>
<td>4,412.3</td>
<td>2,752.3</td>
<td>1,078.7</td>
<td>10,628.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Ukraine</td>
<td>29,827.7</td>
<td>11,900.0</td>
<td>10,255.4</td>
<td>-531.4</td>
<td>30,940.9</td>
<td>0.4</td>
</tr>
<tr>
<td>Prydnistrovia</td>
<td>243.5</td>
<td>113.0</td>
<td>78.3</td>
<td>6.5</td>
<td>284.7</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Source: authors’ calculations.
Figure 8.1 Time series of adjusted numbers of births and deaths for Ukraine, Central Asia and Transcaucasus, 1927 to 1938 (source: author’s calculations).
births during the famine years, represents similar patterns found in Kazakhstan, Prydnistrovia, and Russia. The pattern for Central Asia – a sudden and moderate increase in the number of deaths during the famine years – closing the previous significant difference between births and deaths in these republics, as well as demonstrating a moderate decline in the number of births, represents underlying patterns for Tadzhikistan, Turkmenistan, Uzbekistan, Kyrgyzstan and Belarus. The pattern for the Transcaucasus, a very small increase in the number of deaths and a moderate decrease in the number of births, represents underlying patterns for Georgia, Armenia and Azerbaijan. These patterns suggest a categorisation of regions in terms of the impact of the famine. Republics in the first group suffered the most, the second group was less affected, and the third group was least affected. These preliminary results will be validated later with the estimation of direct and indirect famine losses.

**Reconstruction of yearly populations by age and sex**

Detailed reconstructions were calculated separately for each republic and then aggregated for the Transcaucasus and Central Asia regions. As a first step, complete life tables were constructed for each republic for the base years 1929 and 1939. Life tables for Russia, Ukraine, Belarus and Armenia were constructed using the adjusted age–sex populations from the 1926 and 1939 censuses and registered births and deaths available for these countries and years. Life tables for Georgia and Azerbaijan were constructed using a combination of partial and indirect estimations of vital statistics available for 1926 and 1939 (see Table 8.1). Given the small population size of Prydnistrovia and its similarity to Ukraine, the life table for Ukraine was used for this region.

Since the vital statistics registration system was in its organisational stage during the second half of the 1920s in Kazakhstan and the Central Asian republics, we decided to construct a common model life table for all these republics using the following elements: (1) data collected by expeditions to these countries in 1926, 1928 and 1932/1933 to measure vital statistics; (2) a complete life table for the city of Samarkand constructed by Korchak-Chepurkivskyi, and (3) official registrations of deaths and births in 1938 and 1939.

Starting with the 1 January 1927 population, successive yearly populations are calculated by subtracting from each single age–sex group the respective number of deaths and adding the respective number of net migrants. The first age group was calculated as the number of surviving births plus the number of respective net migrants. This requires the estimation of yearly numbers of deaths and net migrants by age and sex.

**Estimation of the number of yearly deaths by age and sex**

For Ukraine, Belarus and Prydnistrovia, the number of deaths was estimated by applying to the yearly number of deaths (from the balance) the age structures of registered deaths. For Russia, age-specific mortality rates estimated by...
Andreev et al. were multiplied by the respective populations. For Kazakhstan, Transcaucasus and Central Asian republics, we started with age-specific probabilities of dying obtained by linear interpolation between the 1927 and 1939 life tables. These probabilities were transformed into age-specific death rates and then multiplied by the respective populations. This method was used for all these republics and all years except 1933; given the extraordinary effect of the famine in Kazakhstan, the interpolated probability of dying in 1933 was replaced by the respective value for Ukraine. These were initial values used in the first iteration, and they were progressively adjusted in subsequent iterations in order to make them consistent with the adjusted census populations and the yearly balance births, deaths and net migration totals.

*Estimation of the number of net migrants by age and sex*

Due to lack of information, in most republics we applied the age–sex structure of the total population to the total number of net migrants. In the case of Ukraine and Kazakhstan, we were able to refine these estimates with available data on the age–sex structure of special populations. For prisoners in camps we used data in Kokurin and Petrov, while for special settlers in Kazakhstan and Ukraine we used data from the Russian Academy of Sciences. In each case we subtracted the numbers of the special subpopulations from the total number of migrants, applied the respective age structures, and then added them back to the rest of the migrants.

*Reconstruction process*

During the first iteration, at each yearly cycle and before moving to the next cycle, the total population in each republic was adjusted to the respective value in the balance. At the end of the first iteration, the projected 1 January 1939 population did not coincide with the census-based population for that date. To assure consistency with the census-based values, the respective age–sex differences were redistributed backward cohort-wise, and during this process the population age–sex structures were adjusted again to the totals in the balance. We then recalculated the yearly age–sex-specific numbers of deaths using the age–sex structures of the adjusted populations. Finally, the total number of deaths was adjusted to coincide with the respective numbers in the balance. Yearly life tables were recalculated for each republic using the final adjusted populations and deaths.

*Estimation of famine losses*

It is impossible to apply a strict definition of famine losses (i.e. excess deaths and lost births caused by famine), as this requires death statistics by cause of death, and a definition is often problematic even in countries with high-quality vital statistics data on cause of death. The following generally accepted operational
definition is used to estimate direct and indirect losses: difference between actual
deaths (or births) during the crisis years, and deaths (or births) that would have
occurred without the crisis. Thus the operational definition of losses requires two
types of populations: actual (also called reconstructed) populations, and hypo-
thetical populations assuming no famine.

In order to estimate numbers of no-crisis deaths and births, we need to define
'normal' mortality and fertility trends during the famine period. This is done by
linear interpolation of age-specific death and birth rates using beginning and
ending years that were not affected by the crisis. These intervals vary by region,
as mortality and fertility trends were affected by different regional socio-

economic, historical and epidemiological factors.

Analysis of reconstructed vital events allows us to determine these intervals.
Mortality levels started to increase earlier, by 1929, in Central Asia, Kazakhstan
and Russia, and later, by 1931, in Ukraine and the Transcaucasus republics
(Table 8.5). This is probably due to such factors as epidemics of infectious dis-
eases during the first half of the 1930s in the Central Asian republics, waves of
collectivisation of nomad-pastoral peoples in 1929 and 1930 in Kazakhstan, and
increased mortality among prisoners in Gulags in Kazakhstan and Russia at
the beginning of collectivisation. Fertility trends had a different pattern than
mortality trends. As part of a general trend that started in Northern Europe in the
late 1800s, the Slavic Soviet republics were experiencing a fertility decline years
before the famine period, while this process started later in the Asian regions.

For the ending years of the interpolation periods, we selected years not affected
by the compensating effects of the famine, that is, a decline in deaths and
increase in fertility levels, and these years also vary by region (Table 8.4).

No crisis deaths and births during the famine were obtained by multi-
plying the ‘normal’ age-specific mortality and fertility rates for these years by
the respective no-crisis age-specific populations. The estimation of the no-crisis
population is problematic due to the fact that it is very difficult to guess the value
of net migration without the famine. Assuming that net migration is zero for all
years does not solve the problem. Interaction between the age structure of the
population with mortality and fertility levels and their age structures can produce
‘abnormal’ results. For instance, even with lower ‘normal’ mortality levels we

<table>
<thead>
<tr>
<th>Region</th>
<th>Mortality</th>
<th>Fertility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>1929–1936</td>
<td>1929–1938</td>
</tr>
<tr>
<td>Russia</td>
<td>1929–1935</td>
<td>1931–1935</td>
</tr>
<tr>
<td>Central Asia</td>
<td>1929–1936</td>
<td>1929–1936</td>
</tr>
<tr>
<td>Ukraine</td>
<td>1931–1935</td>
<td>1931–1935</td>
</tr>
</tbody>
</table>
may have higher numbers of no-crisis than crisis deaths, and with higher ‘normal’ fertility levels we may have lower numbers of no-crisis than crisis births. Given these problems, we decided to use the reconstructed populations to estimate numbers of ‘normal’ age-specific deaths and births, as this provides a standard that eliminates these structural effects on the number of ‘normal’ deaths and births.

Two observations should be made about the estimation of famine losses. First, the analysis showed that the effects of the 1932/1933 famine were also felt in 1934, and this is especially the case for lost births. Second, the crisis in Kazakhstan started earlier than in the grain-producing European republics. Increased levels of mortality were observed in Kazakhstan starting in 1929 as a result of forced collectivisation of a society composed largely of herdsmen and nomads. Thus the restriction of our analysis of losses during the 1932 to 1934 period, necessary for a comparative analysis with the other republics, underestimates the losses in Kazakhstan.

Direct losses by region

Direct losses for the Soviet Union are estimated at 8.7 million in 1932 to 1934, with 1.0 million in 1932, 7.1 million in 1933 and 0.6 million in 1934 (Table 8.5). Ukraine had the largest number of direct losses during this period among all republics; 3.9 million, with 3.6 million 1933. Russia had the second largest number of direct losses, with 3.3 million in 1932 to 1934 and 2.6 million in 1933, followed by Kazakhstan, with 1.3 million for the period and 694,000 in 1933. The number of direct losses in 1932 to 1934 for the other regions varied between 401,000 for Transcaucasus and 1,584,000 for Central Asia, and in all cases the number of losses in 1933 was significantly higher than in the other two years.

In order to compare losses among the different regions, it is necessary to control for population size. In relative terms, the Soviet Union experienced 18 excess deaths per 1,000 population during the 1932 to 1934 famine period, with 44 per 1,000 population in 1933. Kazakhstan had the largest relative number of direct losses, with 74 per 1,000 for the whole period and 124 per 1,000 in 1933; Ukraine had 43 per 1,000 direct losses for the whole period and 117 per 1,000 in 1933. Relative losses for Russia were significantly lower, with 11 per 1,000 for the whole period and 26 per 1,000 in 1933, while respective numbers for the other regions were much smaller.

Although the majority of direct losses were concentrated in 1933 in all regions, there are significant differences in the yearly distribution of excess deaths among the regions. Ukraine had the highest percentage of excess deaths in 1933 with 91 per cent of all direct losses, followed by 84 per cent in Prydnistrovia and 80.5 per cent in Belarus. In the other regions, the percentage of excess deaths in 1933 varied between 55 per cent in Kazakhstan to 69 per cent in Central Asia. Kazakhstan has a much more uniform distribution of relative excess deaths than all the other regions. Its numbers of direct losses per 1,000
<table>
<thead>
<tr>
<th>Region</th>
<th>Thousands</th>
<th></th>
<th></th>
<th>Per 1,000 population</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1932</td>
<td>1933</td>
<td>1934</td>
<td>1932–1934</td>
<td>1932</td>
<td>1933</td>
<td>1934</td>
<td>1932–1934</td>
</tr>
<tr>
<td>USSR</td>
<td>1,004.0</td>
<td>7,090.8</td>
<td>637.1</td>
<td>8,731.9</td>
<td>6.1</td>
<td>44.1</td>
<td>4.0</td>
<td>18.1</td>
</tr>
<tr>
<td>Belarus</td>
<td>15.6</td>
<td>46.5</td>
<td>5.5</td>
<td>67.6</td>
<td>2.9</td>
<td>8.7</td>
<td>1.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Transcaucasia</td>
<td>12.0</td>
<td>22.9</td>
<td>5.2</td>
<td>40.1</td>
<td>1.7</td>
<td>3.2</td>
<td>0.7</td>
<td>1.9</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>399.3</td>
<td>694.0</td>
<td>164.9</td>
<td>1,258.2</td>
<td>63.4</td>
<td>123.7</td>
<td>32.4</td>
<td>74.1</td>
</tr>
<tr>
<td>Russia</td>
<td>305.6</td>
<td>2,689.4</td>
<td>269.6</td>
<td>3,264.6</td>
<td>3.0</td>
<td>26.1</td>
<td>2.6</td>
<td>10.6</td>
</tr>
<tr>
<td>Central Asia</td>
<td>20.8</td>
<td>109.8</td>
<td>27.8</td>
<td>158.4</td>
<td>2.3</td>
<td>11.8</td>
<td>2.9</td>
<td>5.7</td>
</tr>
<tr>
<td>Ukraine</td>
<td>248.5</td>
<td>3,507.1</td>
<td>162.3</td>
<td>3,917.8</td>
<td>7.7</td>
<td>115.7</td>
<td>5.7</td>
<td>43.0</td>
</tr>
<tr>
<td>Prydnistrovia</td>
<td>2.2</td>
<td>21.1</td>
<td>1.9</td>
<td>25.2</td>
<td>8.0</td>
<td>80.0</td>
<td>7.3</td>
<td>31.7</td>
</tr>
</tbody>
</table>

Source: authors’ calculations.
population in 1932 and 1934 are much higher than in all the other regions. In addition, in all regions except Central Asia, the relative number of excess deaths was higher in 1932 than in 1934.

**Indirect losses by region**

The number of lost births was significantly lower than the number of excess deaths, and both its regional and temporal patterns were different from patterns of direct losses (Table 8.6). Almost three million famine-related births were lost in the Soviet Union during 1932 to 1934. In absolute terms, Russia had the largest number of lost births, with 1.9 million, followed by Ukraine, with 600,000 and Kazakhstan, with 228,000, while indirect losses in the other three regions varied between 81,000 in Central Asia and 109,000 in Belarus. Contrary to excess deaths, lost births were much more uniformly distributed among the three years, and, with the exception of Kazakhstan and mainly due to the nine-month lag between conception and birth, the number of lost births was significantly higher in 1934 than in 1933.

In relative terms, during the 1932 to 1934 period there were 6.1 lost births per 1,000 population in the Soviet Union. Kazakhstan had the highest ratio, with 13.4 followed by Belarus, with 6.8, Ukraine, with 6.6, Russia, with 5.9 and Prydnistrovia, with 5.6. For the Transcaucasus and Central Asia regions, this ratio was around 3.0 lost births per 1,000 population. With minor exceptions, the ranking of this indicator by year follows closely the ranking for the 1932 to 1934 period. Probably the main exception is that in 1933, the relative number of lost births in Ukraine was higher than in Belarus; 9.0 and 7.7, respectively. Belarus has a slightly higher value than Ukraine for the whole period because in 1932, the number of lost births per 1,000 population was almost twice as high in Belarus than in Ukraine.

**Discussion and conclusions**

Using the population reconstruction methodology, we have expanded previous research on the 1932/1933 famine losses with a comprehensive analysis of losses in all republics of the former Soviet Union. This methodology allows us to make separate estimates for direct losses (excess deaths) and indirect losses (lost births). We also show that there were famine-related direct and indirect losses in 1934.

Our results document the uneven effect of the famine in different parts of the Soviet Union during the 1932 to 1934 period and allow us to compare Ukraine’s *Holodomor* experience with that of other parts of the Soviet Union. In terms of excess deaths, we see a clear pattern of three distinct areas: (1) Kazakhstan, Ukraine, Prydnistrovia and Russia were most impacted, with excess deaths per 1,000 population of 74.1, 42.9, 31.7 and 10.6, respectively; (2) Central Asian republics and Belarus were less affected, with respective indicators per 1,000 population of 5.7 and 4.2 excess deaths; (3) the Transcaucasus republics were the least affected, with 1.9 excess deaths per 1,000 population.
<table>
<thead>
<tr>
<th>Region</th>
<th>Thousands 1932</th>
<th>Thousands 1933</th>
<th>Thousands 1934</th>
<th>Thousands 1932-1934</th>
<th>Per 1,000 population 1932</th>
<th>Per 1,000 population 1933</th>
<th>Per 1,000 population 1934</th>
<th>Per 1,000 population 1932–1934</th>
</tr>
</thead>
<tbody>
<tr>
<td>USSR</td>
<td>457.8</td>
<td>1,167.4</td>
<td>1,324.2</td>
<td>2,949.4</td>
<td>2.8</td>
<td>7.3</td>
<td>8.4</td>
<td>6.1</td>
</tr>
<tr>
<td>Belarus</td>
<td>20.8</td>
<td>41.1</td>
<td>47.2</td>
<td>109.1</td>
<td>3.9</td>
<td>7.7</td>
<td>8.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Transcaucasus</td>
<td>8.0</td>
<td>23.0</td>
<td>36.0</td>
<td>67.0</td>
<td>1.1</td>
<td>3.2</td>
<td>4.9</td>
<td>3.1</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>76.8</td>
<td>78.3</td>
<td>72.7</td>
<td>227.8</td>
<td>12.2</td>
<td>14.0</td>
<td>14.3</td>
<td>13.4</td>
</tr>
<tr>
<td>Russia</td>
<td>276.3</td>
<td>72.0</td>
<td>201.3</td>
<td>499.6</td>
<td>8.4</td>
<td>7.0</td>
<td>9.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Central Asia</td>
<td>68.8</td>
<td>274.3</td>
<td>201.3</td>
<td>544.5</td>
<td>2.1</td>
<td>7.1</td>
<td>9.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Ukraine</td>
<td>0.9</td>
<td>1.8</td>
<td>4.5</td>
<td>6.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: authors' calculations.
In terms of lost births, the pattern is somewhat different from that of excess deaths. Kazakhstan experienced the highest level, followed by Belarus, Ukraine, Russia and Prednistrovia. As in the case of direct losses, the Trascaucasus and Central Asian regions had the lowest values of lost births per 1,000 population. In general, the variation in the levels of lost births among the different regions was smaller compared to excess deaths. Ukraine was in third place behind Belarus, but with a value very close to that of Belarus, although in 1933 Ukraine had a higher number of relative lost births than Belarus.

In order to evaluate the effects of the 1932 to 1934 famine in Ukraine in relation to the other Soviet republics, it is necessary to point out the special circumstances of Prydnistrovia and Kazakhstan. It is no coincidence that relative direct and indirect famine losses in Prydnistrovia are quite similar to those in Ukraine. This is because Prydnistrovia was part of Soviet Ukraine between 1924 and 1940, and conditions in Prydnistrovia were very similar to those of other regions of Ukraine. Thus, in terms of famine-related losses, one may consider Prydnistrovia as part of Ukraine.

The causes and dynamics of the famine in Kazakhstan, on the other hand, were quite different from the experience in the rest of the Soviet Union. Although the main driving force behind the famine in Kazakhstan was collectivisation, the implementation of this policy was quite different. Kazakhstan was basically a nomadic and semi-nomadic society. Before collectivisation could begin, it was necessary to transform the nomadic population into sedentary farmers. This policy of 'sedentarisation' started in 1929 and resulted in the destruction of a large part of their livestock, their main means of support, and a total disruption of the social fabric of the population. Hunger turned into famine and people started to die of hunger earlier than in other parts of the Soviet Union. Kulakisation, collectivisation and grain confiscation were additional factors that contributed to the worst case of famine in the Soviet Union. There is general consensus among experts that the famine in Kazakhstan had a different dynamic from the famine in the rest of the Soviet Union. If we exclude Kazakhstan and consider Prydnistrovia as part of Ukraine, we are left with losses, Ukraine suffered the most, with Russia a distant second, and the other regions suffered much less. Specifically, for the 1932 to 1934 period the relative number of direct losses in Ukraine was almost four times as high as in Russia and it was even higher in 1933. In terms of lost births, Belarus had a slightly higher number of lost births per 1,000 population than Ukraine, but in 1933 Ukraine's indicator was 17 percent higher than the indicator for Belarus. Russia was in third place, but compared to direct losses the difference with Ukraine was significantly less.

In summary, we have documented that the 1932 to 1934 famine affected all former Soviet republics, but the level of losses varied greatly, from extremely high levels in Kazakhstan to very low levels in the Transcaucasus republics; that is, everybody suffered but not everybody suffered the same (as pointed out above, the famine experience in Kazakhstan is considered different from the 1932 to 1934 famine). In addition, the effect of the famine was significantly larger in Ukraine, especially in terms of direct losses. Belarus had slightly higher
relative lost births than Ukraine, and the difference between Ukraine and Russia was relatively small. Thus, overall, the effect of the 1932 to 1934 famine was significantly larger in Ukraine than in Russia. However, the effect of the 1932 to 1934 famine was not uniform across the territory of both countries.

Analyses of direct losses by oblast in Ukraine show large regional variations, from very high relative values in the Kyiv and Kharkiv oblasts to very low values in the Donetsk oblast. In Russia, there is evidence that the northern Caucasus region, with a heavy concentration of ethnic Ukrainians, had losses comparable to Ukraine’s, and grain-producing regions like the upper and lower Volga region also experienced heavy famine losses. A more definite answer to the question of whether Russia suffered the same as Ukraine will most likely require the estimation of losses at the regional level in both countries in order to be able to compare regions with similar characteristics.

Appendix: adjustment of census data

1926 census

Military and border personnel were counted separately and registered at their place of service by the 1926 census. In order to align the 1926 census data with the de jure 1939 census data, military personnel were redistributed to the different republics proportionally to the population size of each republic.

Several researchers have pointed out that in republics with large Muslim populations, there were significant undercounts of women aged eight to 27 years due to efforts to hide the consequences of illegal early marriages and of polygamy prevalent in these societies. Based on this research, a total of 135,600 women were added to the populations of these republics, according to the following distribution (in thousands): 37.8 in Uzbekistan, 8.4 in Tajikistan, 8.2 in Kyrgyzstan, 8.1 in Turkmenistan, 27.2 in Azerbaijan, 31.9 in Kazakhstan and 14.0 in northern Caucasus.

Korchak-Chepurkivskyi, Rudnytskyi and Alekseenko have shown that there was also a significant undercount of children aged 0 to two years in this census, especially in Kazakhstan, Central Asia and Transcaucasia, partially to hide the results of polygamy prevalent in these regions. The following adjustment factors were used: 1.10 to 2.42 for age 0, 1.08 to 1.35 for age one, and 1.04 to 1.14 for age two. These factors were derived by a critical examination of the census age structure and estimated fertility and infant mortality trends in each republic, and resulted in adding a total of 1,419,500 children to the USSR population. The final adjustment was the redistribution of persons with unknown age proportionally to the age structure.

The Whipple Index for the different republic populations varied between 125 per cent for men in Ukraine to 333 per cent for women in Azerbaijan, indicating a serious digit preference problem. Different smoothing techniques were used for specified age intervals. For ages 0 to 4, the adjusted figures for 0 to two and reported figures for ages four and five years were used. For ages five to 14, a
3-point running average was used with a weight of 1 for the first and last age and a weight of 3 for the middle age. For ages 15 years or more, the Paievskyi method was used.\textsuperscript{56}

\textbf{1939 census}

Adjustment steps of total populations are described in Table A8.1. We started with the original civilian population in each region (col. 2) and added to them the special subpopulations listed in cols 3 to 5. The total number of armed forces in the USSR by sex was redistributed to each republic according to its civilian population size (col. 3). The other subpopulations (cols 4 and 5) were redistributed based on the analysis done by the Russian Academy of Sciences.\textsuperscript{57} Totals including these adjustments are presented in col. 6.

Control forms were used for the first time in the 1939 Soviet census in order to minimise undercount of persons not present at their usual place of residence at the time of the census. Out of a total of 4,569,000 registered control forms, the authorities decided to add 1,142,000 (0.68\%) persons who were registered in control forms but presumably missed by the census takers. After a careful analysis of the data, Andreev \textit{et al.} decided that this factor was too high and estimated a factor of 0.38 per cent for this adjustment.\textsuperscript{58} We used this factor, as well as a factor of 0.3 per cent to adjust for the overall undercount, instead of the official 1 per cent. This undercount factor was also derived by Andreev \textit{et al.} following an analysis of the 1937 census and of the vital statistics time series.\textsuperscript{59} Thus, for the whole Soviet Union, 635,800 persons were added due to missed control forms (col. 7) and 503,800 due to undercount (col. 8), compared to the official figures of 1,137,752 and 1,679,523, respectively.

We took as a basis the total USSR population of 168,870,900 (col. 10), as estimated by Andreev \textit{et al.}\textsuperscript{60} By applying successively the adjustments for control forms and undercount, we still needed 414,800 (col. 9) to obtain the number in col. 10 (this is the so-called ‘unexplained difference’). In order to estimate the total population for Russia in col. 10, we started with the Andreev \textit{et al.} estimate of 107,968,000 and deducted 115,000 persons who at the time of the 1939 census lived in areas belonging to Estonia and Latvia.\textsuperscript{61} We then added 89,700 and obtained 107,952,700 as the total population of Russia (col. 10). The 89,700 figure was derived as follows: Andreev \textit{et al.} estimated 669,000 as the number of persons in special populations who were reallocated from Russia to other republics, mainly to Ukraine and Kazakhstan,\textsuperscript{62} while an analysis of original sources showed that this number was 758,700.\textsuperscript{63} Thus we needed to add the difference (758,700 – 669,000 = 89,700) to Russia’s total population. Adjustments for control forms and undercount for Russia were estimated using the respective proportions of these figures for the Soviet Union.

For the other regions we took the difference between cols 10 and 6 for the USSR and subtracted the respective difference for Russia, which gave us the total adjustments for control forms, undercount and ‘unexplained difference’ for the other regions. The respective values for each region were obtained by the
Table A8.1  Adjustment steps of 1939 census’ total populations (in 1,000s) for the USSR and its seven regions

<table>
<thead>
<tr>
<th>Regions</th>
<th>Reported civilian population</th>
<th>Special subpopulations</th>
<th>1 + 2 + 3 + 4</th>
<th>Corrections</th>
<th>5 + 6 + 7 + 8</th>
<th>Official data</th>
<th>% adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Army</td>
<td>Civilian population related to the NKVS</td>
<td>Groups A, B, C¹</td>
<td>Correction for control forms</td>
<td>Correction for undercount</td>
<td>Correction for the ‘unknown difference’</td>
<td>%[(9/10)–1]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USSR</td>
<td>161,434.7</td>
<td>2,102.2</td>
<td>259.8</td>
<td>3,521.8</td>
<td>167,316.5</td>
<td>635.8</td>
<td>503.8</td>
</tr>
<tr>
<td>Belarus</td>
<td>5,262.8</td>
<td>68.5</td>
<td>3.3</td>
<td>45.6</td>
<td>5,380.1</td>
<td>26.1</td>
<td>20.7</td>
</tr>
<tr>
<td>Transcaucasia</td>
<td>7,762.6</td>
<td>100.9</td>
<td>5.4</td>
<td>60.1</td>
<td>7,929.1</td>
<td>38.5</td>
<td>30.6</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>5,157.9</td>
<td>67.1</td>
<td>13.3</td>
<td>187.1</td>
<td>5,425.5</td>
<td>26.4</td>
<td>20.9</td>
</tr>
<tr>
<td>Russia</td>
<td>102,690.7</td>
<td>1,336.0</td>
<td>219.5</td>
<td>2,867.2</td>
<td>107,113.3</td>
<td>343.4</td>
<td>272.1</td>
</tr>
<tr>
<td>Central Asia</td>
<td>10,210.7</td>
<td>132.9</td>
<td>10.3</td>
<td>155.6</td>
<td>10,509.3</td>
<td>51.0</td>
<td>40.5</td>
</tr>
<tr>
<td>Ukraine</td>
<td>30,073.7</td>
<td>391.3</td>
<td>8.0</td>
<td>204.6</td>
<td>30,677.4</td>
<td>149.0</td>
<td>118.1</td>
</tr>
<tr>
<td>Prydnistrovia</td>
<td>276.3</td>
<td>3.5</td>
<td>0.0</td>
<td>1.6</td>
<td>281.8</td>
<td>1.4</td>
<td>0.9</td>
</tr>
</tbody>
</table>


Notes
1 NKVS: Narodnyi Komisariat Vnutrishshmykh Sprav [Peoples Commissariat of Internal Affairs].
2 A = NKVS; B = Prisoners; C = Exiles.
proportions of their populations in col. 6. We then applied to the total adjustment for each region the proportions for each of the three adjustments for the Soviet Union. This completes cols 7, 8, 9 and 10 for the other regions.

Official census populations are given in col. 11, and in col. 12 we have the relative percentage differences between the official census populations and the adjusted values. For the whole Soviet Union, the overestimate was 1 per cent. Kazakhstan had the largest overestimate, with close to 10 per cent, followed by Ukraine and Belarus, with 2.3 per cent each and Russia, with 0.9 per cent. The adjusted population for Transcaucus was practically the same as the official population, while the estimated population for Central Asia was actually larger than the official population, contrary to expectations. One possible explanation is that the actual residence of armed forces was not proportional to the total population in each region, as was assumed in our calculations, and that perhaps the actual number of soldiers in these Asian republics was somewhat smaller.

The age–sex structure of the civilian population was adjusted to the new totals, taking into account the very different age–sex structure of prisoners and resettled kulaks. Specifically, these subpopulations were subtracted from Ukraine and Kazakhstan and added to Russia, using the fairly detailed age–sex information available. Finally, the category age unknown was distributed proportionally to the adjusted age–sex structure, and age heaping was smoothed using the same methods as for the 1926 census.

Acknowledgements

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Notes


2 Vallin et al. and Conquest provide these contrasting estimates of excess mortality respectively; Jacques Vallin, France Meslé, Sergei Adamets and Serhii Pyrozhkov, ‘A New Estimate of Ukrainian Population Losses During the Crises of the 1930s and 1940s’, Population Studies 56(3) (2002), 249–264; Conquest, Harvest of Sorrow.


6 Andreev et al., *Demograficheskaya istoriya Rossii* [Demographic History of Russia: 1927–1959].


19 TsDAVOV [Tsentralnyi derzavnyi arkhiv vysshikh organiv vlasty (Central Government Archives)]. Fond 582, opys 11, sprava 152, 201–202, 274 (in Russian).


21 RGAE, Russian State Archive of Economy. Fond 1562, opis 336, delo 604 (in Russian).

22 RGAE, Russian State Archive of Economy. Fond 1562, opis 20, delo 20, 29, 30, 34, 38, 41, 42, 48, 61, 73, 75, 86, 126, 143, 147, 153, 155 (in Russian).

Famine losses in Ukraine in 1932/1933


29 RGAE, Russian State Archive of Economy. Fond 1562, opis 20, delo 20, 29, 30, 34, 38, 41, 42, 48, 61, 73, 75, 86, 126, 143, 147, 153, 155 (in Russian).


32 RGAE, Russian State Archive of Economy. Fond 1562, opis 20, delo 20, 29, 30, 34, 38, 41, 42, 48, 61, 73, 75, 86, 126, 143, 147, 153, 155 (in Russian).

nuditelnykh migratsiyi v S.S.S.R. [Against One’s Will]; Mazokhin, ‘Statistika repre-


Famine losses in Ukraine in 1932/1933


47 Zhiromskaya, Demograficheskaya istoriya Rossii v 1930-e gody: vzglyad v neizvestnoye [Demographic History of Russia in the 1930s: A Look into the Unknown].


51 Pianciola, ‘The Collectivization Famine in Kazakhstan’; Davies and Wheatcroft, Years of Hunger; Snyder, Bloodlands: Europe Between Hitler and Stalin.

52 Rudnytskyi, Urban-Rural Dynamics of the 1932–1933 Famine Losses in Ukraine.