Mortality-Migration Interplay

Case of Russia after the USSR

By Boris Denisov (Interdisciplinary Center for AIDS Research and Training, denisov@demography.ru) and Vassily Vlassov (Moscow Medical Academy, vlassov@cochrane.ru)

Abstract

In this paper we display possible sources of large fluctuation in Russian mortality after the collapse of the Soviet Union. In addition to general demographic approach of splitting age, period and cohort determinants of demographic events we wish to attract attention to data quality. There is an obvious contradiction between the routine count of migration and data appeared after the 2002 census. Although some experts consider even census data as incomplete and biased, these data made demographers and government agencies reconsider the estimates of migration flow size. We also draw attention to the uncommon migration data source, namely number of HIV tests performed to foreign citizens. Taking into account that the completeness of death registration is much better than a count of migrants, we suppose that diminished denominator increases mortality over its intrinsic level. Then we recalculate the mortality, given more or less realistic hypotheses about the size of unobserved migration. Finally, we obtained that each unobserved million of migrants reduces life expectance by about 0.2 years. We conclude with discussion on possible application of the approach to population smaller than national and possible bias of mortality levels in countries linked to Russia with significant migration flows.

Data

There are three types of data engaged in our study: (1) data on international migration, population exchange between Russia and the rest of the world [1]; (2) mortality data in the form of age-specific death rates and life expectancies [1]; and (3) data on a number of HIV tests performed on foreign citizens who arrive to Russia for a period more than three months [2]. Rosstat (Russian national statistical agency) publishes two first types of data; and Federal AIDS Center publishes the last.

Most experts consider migration data are unreliable and underestimating both migration flows-emigration and immigration. Lots of change took place in the period under study. Dr. Chudinovskikh supposed that from 1996 to 2002 the Soviet system of migration data collection had been completely destroyed [3]. Within the USSR the system had been based on registration in a place of residence (*propiska*). Local offices of Ministry of Internal Affairs were responsible for this procedure. A person having no such registration was a subject to administrative punishment. Moving to another location for a certain time a person had to present a tear-off ticket (*otryvnoi talon*) to a passport bureau, statistically this meant that s/he had been recorded at a place of destination and removed from records at a place of departure. This Soviet style had been terminated in 1996. Ministry of Foreign Affairs collected data on a small portion of international migration namely that of diplomats and akin persons. Through the (not very wide) network of visa and registration offices (*OVIR*) Ministry of Internal Affairs collected data on the major part of migration although rather modest in size. Recently that infrastructure raised and now it is a part of Federal Migration Service. An unrecorded foreign citizen within a Soviet territory was definitely a spy ☺

Decay of the USSR converted a bulk of migration flows from internal to international. In order to avoid an emergence of numerous alien population Russia together with other former SU republics established Commonwealth of Independent States (CIS) which is helping to complete a *divorce* of the former union republics. The concept of near and far foreign nations emerged. As a result a CIS citizen (i.e., a citizen of CIS member state other than Russia) became sometimes a subject to both Russian and international law, and in many cases to neither law at all. Migration flow from *far* foreign countries increased since then, but remains smaller than former internal migration. In 2002 Russia introduced a new system of monitoring international migration – a person crossing a Russian border has to fill a migration card, but the effect of those measures is not clear. According to report of the Federal Migration Service a number of foreign workers in 2008 was above two million.

The 2002 Russian census counted total population greater than RosStat expected figure by almost two million. RosStat assigned this surplus population to a hidden immigrant population. Many experts believe that those two million are just a tip of an iceberg since the census itself was incomplete, and true size of hidden population is up to twenty million.

Mortality data enjoy greater accuracy. Wide network of legal status recording offices (*ZAGS*) collects these data. *ZAGS* Federal Law among other regulations describes a form of death certificate which includes a field "citizenship". That means that death uncover any person whatever hidden s/he was alive. Neither transportation to home country, nor burial in Russia are possible without death certificate. Dealing that way with undocumented dead body is committing a crime. Thus data on deaths are near complete. However, nothing is perfect, and we do not forget that Russian life tables had been excluded from Coale-Demeny analysis, which brought into being regional model life tables, due to their dubious quality.

The data on a number of performed HIV tests come not from RosStat but from Federal AIDS Center. The latter maintains a wide network of local AIDS centers covering the whole country [4]. The test is a voluntary action performed to obtain a work permit, or in other words to obtain a legal status. The AIDS Federal Law forbids foreign citizen to have a job without confirmed negative HIV status. We consider data on a number of HIV tests as a good alternative source for approximation of migration size. The graph below reveals that in the year 2001 RosStat data coincided with Federal AIDS Center data, after that the latter data show greater figures.

Calculations

Life expectancy at birth is the most common and widely used indicator of mortality. To obtain its value special agencies collect vital statistics, monitor population change, and calculate life tables. The usual technique of life table calculation is kind of a transition from age specific death rates to probabilities of dying and other life table indicators, including life expectancies. Source material of a life table is usually a set of age-specific death rates. These rates actually are a set of fractions of observed deaths in numerator (died during a year) and respective populations at risk in denominator (mid-year populations at a certain age). A fraction is bigger if the numerator is bigger, and a fraction is smaller if the denominator is bigger. Smaller death rates produce longer life expectancy. Thus, assuming, that some of migrants are not registered, although they surely belong to at risk population, we recalculated new death rates to obtain estimates of life expectancy. We used MortPak for these calculations [5]. For easier understanding we transformed life expectancy at birth into a death rate, since life table death rate is an inverse value of life expectancy at age 0 [6].

Constraints and assumptions

We restrict our study to male population since demographic indicators in this slice of population are a major source of headache for Russia, and the majority of migrants are also males. According to Federal Migration Service ninety per cent of labor migrants belong to age group 18-49. Fragile manhood or excess male mortality, especially at adult ages, is probably the major inherent feature of Russian demographics.

Female mortality at adult ages is also higher than the west pattern, but not as high as male one. We restrict our calculation to the year 2000 only, and we use the hypothetic size of hidden migration of 1, 2.5, 5, 7.5, and 10 million. Taking into account that age distribution of migrants is more or less constant, we distributed these additional men by age groups averaging the data for 2002-2006. We presume that age schedules of hidden and visible migrant populations are same. We also suppose no migration at ages below 15 and elder than 60. Thus our calculations produced conservative estimates.

Pic. 1 Age distribution of migrants
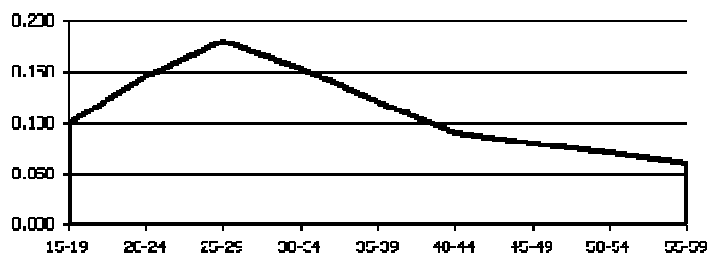
Results

We summarize the data from all the sources in the summary graph. In this graph RM stands for registered migration (destroyed system remains working) from CIS nations and three Baltic republics, rest of migration is negligible; CCM – census corrected migration; FCT – number of HIV tests; DR – reported crude death rate; ILE – life table death rate or inverse life expectancy at birth.

Pic.2 Data on migration and mortality
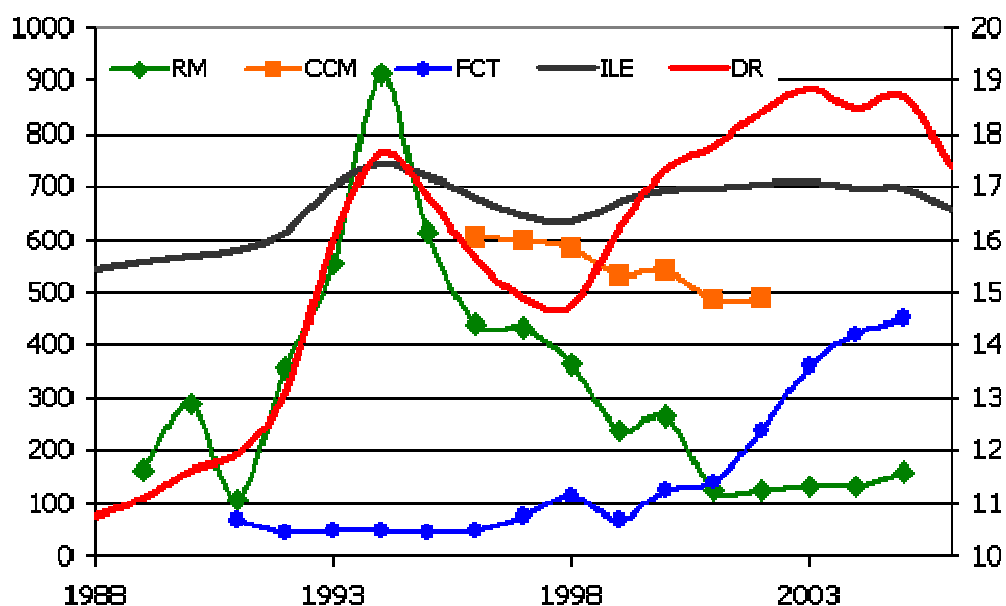
Migration – left vertical axis, thousand, mortality – right one, per thousand

The graph portrays no clear relationship between migration and mortality except for coincidence around the year 1994, the bottom of post communism crises in all republics of the

former Soviet Union. It also shows that census estimated migration in some years is five times registered migration, and this estimate is close to the numbers coming from Federal AIDS Center. The variation in crude death rate is naturally wider than in inverse life expectancy, although the two are becoming closer revealing a contradictory but nevertheless diminishing influence of age structure.

The resulting life expectancies at birth plotted against hypothetical sizes of hidden population on a graph follow a linear pattern: $e_0=0.1784h+59.142$, where e_0 stands for life expectancy at age 0, and h – for hidden population size, with $R^2=0.998$. That means that one additional million of population increases the life expectancy by 0.2 year, or in other words one unobserved million of population (most likely migrant population) decreases life expectancy by 0.2 year. The result means that data quality or completeness of migration count may not be a major cause of observed recent variations in life expectancy. However, in (un)certain years they may disturb or hide real direction of mortality development. The year 1994 may be a good example of confounding effect not only of cohort (born during a period of socialist reforms in agriculture, which generated an immense famine, came to age 60 and over) and period (bottom of post-communism crisis), but also of data quality factors (massive inflow of undocumented migrants).

RosStat publishes per thousand death rates with one decimal, or four digit numbers. For instance, male mortality at age 0 in 2000 was 17.3. Taking one step further to the fifth digit, we may guess that the reported figure actually covers a range from 0.01725 to 0.01734. Repeating this procedure for all age groups we obtained two edges of reported set of figures. Lower edge gives life expectancy at birth 59.1 and higher one – 58.9. Starting from the number of deaths as a true number, we calculated two estimates for populations at risk (death rates denominators). Two sums of the obtained estimates gave two total populations. Difference between them exceeds two million. Thus published mortality rates suppose total population being in a range ± one million. In other words presence of about a million of hidden population does not affect life expectancy.

Discussion

We focused our attention on a national level due to availability of data. However, the described approach might be easily and even more effectively applied for regional populations for the solution of the inverse problem– indirect evaluation of hidden population size given realistic assumptions on actual mortality level. For instance, Institute of Demography increased life expectance at birth for population of Moscow by about three years for a period since about 1992 [7]. Basing on our result we suppose that the level of mortality might be overestimated in all former Soviet republics, which have a significant portion of their citizens residing in Russia, due to double count of deaths (in Russia and at home).

References

1. O. S. Chudinovskikh, Legal foundations of state statistical observation upon migration flows, Voprosy Statistiki, 2006, No 8

2. United Nations, MortPak for Windows, New York, 2003

3. RosStat, Series of yearbooks, and computer files

4. Federal AIDS Center, Series of bulletins "HIV Infection", these data are more easily available at http://www.afew.org

5. B. P. Denisov, Russian HIV Case Reporting System, Paper presented to EAPS meeting at Liverpool, UK, 2006 (available on the Internet at http://epc2006.princeton.edu/download.aspx?submissionId=60448)

6. Institute of Demography, Series of annual reports "Population of Russia"

7. D. P. Smith, Formal Demography, Plenum Press, 1992

8. Report of the Federal Migration Service available at http://www.fms.gov.ru

Acknowledgements