

Lessons learned with the application of indirect methods for the evaluation of (infant) death registration in Central Asian republics by subnational characteristics

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Background

In 2013, I conducted with collaborators a study of infant mortality in Kyrgyzstan, which was published in *Population Studies* (attached). The purpose of the study was not to evaluate death registration per se, but to examine the impact of the break-up of the Soviet Union on infant mortality in this Central Asian republic, using all available sources. This study was conducted in collaboration with the National Statistical Committee (NSC) of the Kyrgyz Republic, and thus we had access to more detailed vital registration information than typically available.

While conducting the study, it quickly appeared that the Vital Registration (VR) information used by NSC for producing official IMR levels had some important flaws. First, the levels of IMR reported in the VR data were much lower than those reported by sample surveys such as the DHS, which suggested an important amount of under-registration. Second, the VR information showed suspicious patterns by sub-groups. Rural areas, which presented higher IMR levels than urban areas during the Soviet period (as expected), started to present a mortality *advantage* after the country's independence in 1991. Moreover, the VR data presented a rather implausible pattern of narrowing of the IMR ethnic differential (Slavs vs. Central Asians). These patterns of errors motivated us to design an adjustment procedure specifically tailored to address Kyrgyzstan's data circumstances, but with implications beyond this country.

Approach

This study used a variety of sources to estimate IMR levels and trends, including full birth histories in the DHS and summary birth histories in the MICS and census data. Standard methods were used for these sources ("direct" for DHS and "indirect" for MICS and census data).

In addition, this study devoted particular attention to the design of a procedure for adjusting the VR-based IMR information. Details of the procedure are explained in the published article (attached), but the logic of the approach rests on the following principles:

- 1) After examining the age pattern of mortality below age 2 in the VR data by month of age, we realized that while the reported IMR was severely affected by underreporting of deaths and age heaping issues, the reported life table probability that a child age 3.0 months will die before reaching age 24.0 months (${}_{21}q_3$) was much less likely to be underestimated.
 - 2) We observed that in Sweden and England & Wales, there was a very strong log-log linear relationship between IMR and ${}_{21}q_3$ going back to at least the beginning of the twentieth century. The relationship was nearly identical in the two countries.
 - 3) We observed that until 2004, the IMR vs. ${}_{21}q_3$ relationship was very different in the VR data for Kyrgyzstan and indicative of IMR underestimation. After 2004, following an important improvement in the way neonatal deaths were recorded in Kyrgyzstan (change of definition of stillbirths vs. live births), the IMR vs. ${}_{21}q_3$ relationship became very similar to that observed in the Swedish and English data.
 - 4) We thus decided to model the IMR vs. ${}_{21}q_3$ relationship using the Swedish and English
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Plans for future research and recommendations

- 1) The model age patterns presented in the Kyrgyzstan study should be expanded such that they cover the global diversity of epidemiological environments. This includes both more- and less-developed settings.
- 2) The indirect estimation procedure based on these models should be flexible enough such that they can be accommodated to country-specific under-registration issues. While ${}_{21}q_3$ was a useful entry point in the adjustment model for Kyrgyzstan, other entry points may be more relevant in other countries.
- 3) The indirect estimation procedure should be able to produce uncertainty intervals around adjusted estimates.
- 4) The performance of this approach in countries outside the Former Soviet Union should be examined. Countries of the Middle East and North Africa (MENA) region are particularly promising candidates for a productive application of this procedure.
- 5) This procedure relies on death distributions by detailed age, including months or trimesters during the second year of life. While age details are broadly available below age one, they are much less available at age one or above. Countries should be encouraged to publish such information (by sex and other subgroups), or make it more easily available to analysts.

Note that an R01 research proposal addressing these issues has been submitted to the NIH (funding status pending as of 26 October 2016).