«Ethnic inequalities and adult mortality in sub-Saharan Africa: preliminary results from DHS data on kin survivorship»

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Background

It is well acknowledged that adult mortality in sub-Saharan Africa suffers from lack of scientific and political interest. This is partly due to the shortage of available empirical data, which limits the scope for direct estimation of adult rates. The lack of information on characteristics of deceased persons also precludes attempts to go beyond estimates of mortality risks for the total population.
In this context of scarcity of vital data, ethnic differentials in adult ages in Sub-Saharan Africa are insufficiently analyzed. But DHS kinship survivorship statistics allow us to show that different subgroups have been largely unequally hit by recent sharp increases in adult mortality.

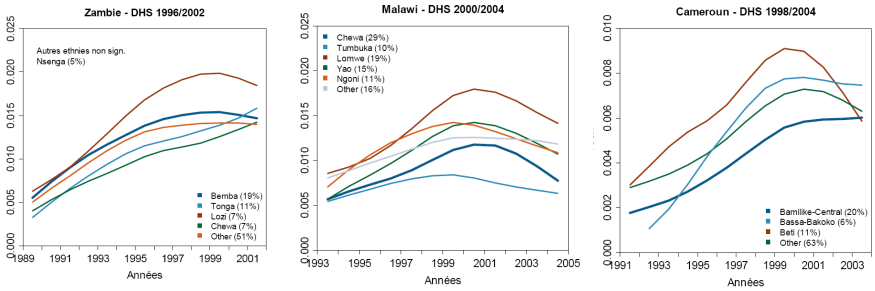
The « familial technique »

As kin (parents and siblings) tend to cluster within some geographical areas, and as they share, to a certain extent, some socio-cultural characteristics (such as ethnic membership), one can see in the characteristics of the respondent a good proxy of the characteristics of relatives whose survival status is declared.

From then on, covariates related to the respondents as well as contextual characteristics from the sampled clusters can be used to explore social and geographical inequalities in adult mortality. Thus far, the work of Graham et al. (2004) is the only one that has used this "familial technique" and shown that maternal deaths could be linked to poverty. We build in this work to explore ethnic and geographical inequalities in general adult mortality. We suggest going further by adequately combining different analytical levels with hierarchical models.

Large ethnic inequalities in adult mortality risks in SSA

DHS sibling data show that ethnic membership is a statistically significant covariate of prime-age adult mortality in several African countries. In figures below, smoothed standardized mortality rates between age 15 and 50 are plotted by ethnic group (for groups whose share in the population is above 5%). The largest group serves as reference (in bold line-style).



Different patterns of gradients are observed, and there is no evidence in favour of an eventual advantage of the largest ethnic group. As several DHS surveys can be combined, trends can be assessed and they tend to show growing disparities in the last decades, probably due to unequal impact of HIV-aids among ethnic groups. Such growing disparities along ethnic lines pose challenges to the interpretation of recent mortality trends and deserve further attention.

Methods

Direct estimation of adult death rates among people aged 15 to 50 are obtained from a Poisson regression, in a person-period file. See Timaeus and Jasseh (2004) for an extensive description of the methodology. The ethnic group is incorporated in the model as an explanatory variable, and rates are then smoothed with cubic splines.

Orphan prevalence has been converted into survival probabilities with coefficients taken from Timaeus (1992).

Consistency between orphanhood and sibling data

In Kenya, a dramatic excess of mortality for the Luo group, can be seen from DHS sibling data. It might seem implausible but is consistent between 1998 and 2003 surveys.
We can also highlight similar sharp disparities with the "familial approach" applied to orphanhood data, as shown in the second figure, where prevalence of maternal orphanhood has been converted into probabilities of death.

Figure 1 : Smoothed adult mortality rates by main ethnic groups – DHS Kenya 1998 & 2003

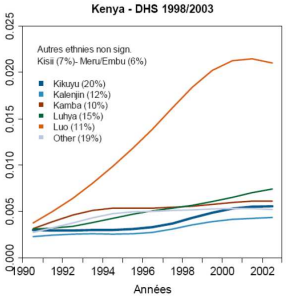
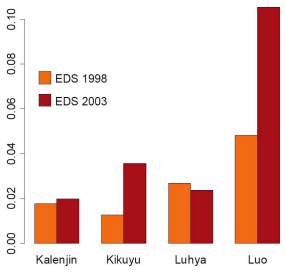


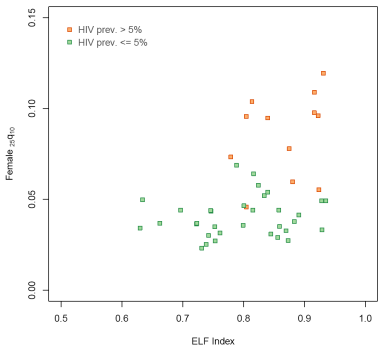
Figure 2 : Estimates of female 10q25 from orphanhood data based on Kenya 1998 & 2003 DHS



Ethnic fractionalization and mortality : insights from orphanhood estimates

Moradi and Baten (2005) have used anthropometric measures to document health inequalities in Sub-Saharan Africa and noted a significant impact of ethnic fractionalization. Such insights from demographic data have echoes of conclusions from econometric analyses pointing ethnic fractionalization as a cause of "political economy of unequal subsidies and discrimination" in Sub-Saharan Africa (Easterly & Levine, 1997; Milanovic, 2003).

We have tried shed light on a potential association – at the cross-national level - between adult mortality and ethnic fractionalization from DHS estimates of maternal orphan prevalence. Ethnic fractionalization has been approximated by the frequently used index of ethno-linguistic fractionalization (ELF), computed from shares of ethnic groups in the DHS individual files. As can be seen in the next plot, orphanhood-based estimates of mortality show no evidence of a negative impact of ethnic fractionalization on mortality. This, again, deserves further study.



The ELF index measures the probability that two randomly drawn individuals belong to different ethnic groups.

Countries for which DHS surveys are used : Benin, Burkina Faso , Cameroon, Central African Republic, Congo, Democratic Republic of the Congo, Cote d'Ivoire, Ethiopia, Gabon , Ghana , Guinea, Kenya, Malawi, Mali, Mozambique, Namibia, Niger, Uganda, Senegal, Chad, Togo, Zambia

Extensions to multilevel models

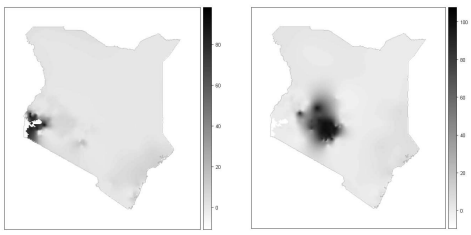
It is difficult to distinguish between geographical inequalities and ethnic disparities, since ethnic groups usually cluster within specific geographical areas. This is obvious from these two maps for Kenya, based on geo-coded DHS 2003 data and space interpolation.[1]

Multilevel analyses are therefore needed to combine individual information and contextual covariates, and to address the issue of correlation of cluster-level errors. A greater heterogeneity in the distribution of deaths is expected especially in countries severely affected by the AIDS pandemic, due to its diffusion through sexual networks. Hierarchical models also permit to deal with the unreliability of estimates at sub-regional levels. They will borrow strength from bigger clusters by pooling together information and giving less weight to clusters with small sample size, while estimation of cluster-level mortality rates by classical models would be unfeasible.

1: See the prevR package developed by Joseph Larmarange (PopInter) for the R statistical tool : http://joseph.larmarange.net/-prevR-.html

Map 1 : Share of Luo women aged 15-49 within DHS clusters

Map 2 : Share of Kikuyu women aged 15-49 within DHS clusters



Preliminary research confirms those expectations about spatial clustering of adult mortality risks. By fitting a random intercept model to the sibling survival data from the DHS 2003 Kenya, using Poisson regression on a person-period file, we can observe a positive and significant variance of the random effect at the district level. This calls for an investigation of this contextual variation and the real importance of ethnicity, with both covariates seized at the district level (such as HIV prevalence, distance to various types of health services and infrastructures, main ethnic group) as well as other individual confounding factors (wealth index, education level, etc.).

References

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