The D R Congo conflict (1998-2004): Assessing excess deaths based on war and non-war scenarios

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Introduction

It has been acknowledged that demographic consequences of armed conflicts carry important policy implications. This is because armed conflicts can have severe pervasive effects on all three components of population change (Brunborg and Tabeau, 2005). Despite their devastating nature, policy implications and the sustained media coverage, the effects of armed conflicts on demographic components of population change are challenging to quantify objectively. Several Studies (Coghlan et al., 2006; Lambert & Lohlé-Tart, 2008) assessing excess deaths linked to the armed conflict in the Democratic Republic of Congo (DRC) found conflicting estimates of excess deaths. This paper uses an alternative approach where war and non-war scenarios are modelled combining selected sets of data and varying assumptions to determine the extent of excess deaths associated with the DRC armed conflict for the period 1998-2007; same as the above mentioned studies. The war situation has been defined according to a period affected 1995 to 2004 by the armed conflict and non-war a period considered as non-affected by the war: before 1995 and after 2004.

Background

The International Rescue Committee's (IRC) work (Coghlan, et al., 2006) on excess deaths has been the most prominent study to have quantitatively assessed demographic consequences of the armed conflict in the DRC. The IRC study is the most cited[1] work on the extent of excess deaths related to the armed conflict in the DRC. The IRC also informs various actors involved with population related issues in the DRC within the international community (UN Office of the High Commissioner for Human Rights, 2010). Despite its renowned contribution to humanitarian causes and its willingness to deal with challenging questions linked to the assessment of excess deaths in the DRC, selected aspects of IRC's study are open to criticism. Lambert and Lohlé-Tart (2008) challenged the IRC's founding by pointing, for instance, to its choice of mortality baseline[2]. They argued that mortality in the DRC was already high before the conflict. Using a different approach they found a much lower excess death estimate of ***200,000*** compared to the ***5.4 million*** excess death estimate found by the IRC for the same period (1998-2007). However, their study has not received as much prominence as the IRC's. In this respect, this paper looks at selected aspects of both the above mentioned studies to propose an alternative approach in assessing the extent of the DRC excess deaths for the period considered (1998-2007).

Data

This paper combines selected sets of data ranging from the latest census (1984) and recent demographic surveys in the DRC, including: Multiple Indicator Cluster Surveys (MICS1 of 1995; MICS2 of 2001) and the Demographic and Health Survey of 2007. The census and surveys are important to derive demographic estimates and reconstruct population dynamics after 1984. The assessment conducted here is based not only on comparing war and non-war scenarios of population change, but also on varying assumptions. This study's assessment of the population losses is set to be empirical and comparable with existing studies; given the data and analytical tools at hand. The choice of data and the resulting model are set out to improving approaches to quantitatively investigate the extent of demographic consequences of the armed conflict in the DRC. In the same way, it has to be

[1] A quick search, for instance, on Google Scholar engine gives about 1,370 results; as of 20 Oct 2012.
[2] The IRC used the average Sub-Saharan Africa mortality rate and compared it with mortality rate in the DRC during the conflict period. The difference between the two helped them derive the DRC's conflict-related excess population loss.

acknowledged that input, as well as output data related to armed conflicts can be subject to controversy. This is because statistics related to armed conflicts can be a sensitive topic, which gets politicised to accommodate various agendas defended by protagonists involved in a given armed conflict.

Methodology

Following Heuveline's (1998) reconstruction of Cambodian's war-related demographic estimates, the cohort-component method of projection has been used to model this paper's analyses. Mortality estimates were derived from the census using indirect methods and selected model life table systems. Here, only one model (Brass logit system) has been selected to illustrate the process. The choice was motivated by its simplicity of use. Pairs of survivorship probabilities, one from birth and another conditional on attaining a certain age, determine a set of survivorship estimates needed to constitute a complete life table. With the observed survivorships at younger ages (0 to 20 years old) and adult age (21 to 75 and above) as captured from census question on orphanhood, estimates were derived from the following equations; See (UN Manual X, 1983; Newell, 1988, pp. 151-166):

$$Y_{Fit}(x) = \alpha + \beta * Y_s(x); \qquad Y_s(x) = 0.5 * ln((1- l(x)) / l(x)),$$

where $Y_{Fit}(x)$ is the logit of the fitted model at age x and $Y_s(x)$ are logits obtained from the UN General standard model life tables, α is the intercept and β is the slope of the line, altering α will affect the level of mortality, while altering β will affect the relationship between childhood and adult mortality. The fitted values of l_x are then computed by taking the anti-logits of Y_{Fit}(x) using the equation below.

$$Fitted\ l_x = 1 / (1 + e^{2\ YFit(x)})$$

Fitted l_x represents survivorship probabilities to be used in the model life table needed for the cohort component projections, and $Y_{Fit}(x)$ represents the logits of the fitted model at age x.

Fertility estimates were modelled based on past fertility schedules and the 1984 census' information on fertility. Direct estimates on fertility found in more recent surveys were used to benchmark population projections. This allowed deriving various fertility estimates including the age specific fertility rate (ASFR) to be used in the projection. Crude birth rate (CBR) was estimated from 1984 census data on children aged less than one year old divided by the total population. To account for children who died before the considered year, the calculated CBR was multiplied by the number of survivors at exact age 0 over the average number living between exact ages 0 and 1. Direct fertility estimates from recent surveys were added to the model to benchmark population projections.

Using 1984 as the launch year, two cohort component projections were conducted for a thirty years period of five years intervals, assuming two (war and non-war) scenarios to apply varying assumptions. The difference between the two scenarios as projected was set to provide a range of estimates containing the approximate figure of excess deaths.

The same analysis was replicated for an open population where migration data as obtained from the World Bank[3] and scheduled under seven parameters[4] reflecting the 1984 census and 2007 DHS migration schedules was incorporated.

[3] Source: http://data.worldbank.org/country/congo-dem-rep accessed on 20 November 2012.
[4] Childhood, labour force, retirement and elderly curves. See Wilson (2010) for more details.

Results

Based on the population projections' outputs, it was possible to juxtapose the number still alive at the beginning of the next projection interval before computing the number of births for each subgroup over the same interval. After that the number of deaths and missing persons was then deducted. It is worth noting that the difference between the war and non-war scenarios relate to excess population loss since this could also account for the effect of migration and that of shortfall in births in addition to excess mortality. However, to keep matters comprehensive, the term excess deaths is used throughout this paper.

Table 1 below summarises estimates of population loss between 1998 and 2007 as measured following the factual and counterfactual population projections whilst assuming on the one hand that 1984 fertility converged to fertility observed in 2007 and on the other hand that 1984 fertility remained unchanged for the projection period.

Table 1 Population losses between 1998 and 2007 in thousands

	Non-War Deaths	War Deaths	**Excess Deaths**	Excess net migration per year
Counterfactual fertility level kept unchanged from 1984 to end of projection				
Open Population	6,762	8,229	**1,468**	-915
Closed Population	6,818	8,509	**1,692**	0
Indirect impact of non-zero migration on excess death estimates	-56	-280	**-224**	N/A
Counterfactual 1984 fertility level converged to 2007				
Open Population	6,574	8,150	**1,576**	-915
Closed Population	6,626	8,509	**1,883**	0
Indirect impact of non-zero migration on excess death estimates	-52	-359	**-308**	N/A

Source: Own estimation based on DRC 1984 census, MICS1, MICS2 and 2007 DHS

In Table 1 above the top part shows the number of excess deaths resulting from the difference between the factual and counterfactual scenarios when it is assumed that, for the counterfactual scenario, fertility level observed in 1984 remained unchanged for the whole projection period. As said above, the estimated number of excess deaths is 1.5 million for an open population and 1.7 million for a closed population from 1998 to 2007.

The bottom part of Table 1 shows the number of excess deaths resulting from the difference between the factual and counterfactual scenarios when assuming that, for the counterfactual scenario, 1984 fertility level converged with that observed in 2007 at the end of the projection period. Here the number of excess deaths is 1.6 million for an open population and 1.9 million for a closed population from 1998 to 2007.

The indirect impact of non-zero migration is 56,000 less deaths when assuming that fertility level observed in 1984 remained unchanged for the whole projection period and 280,000 less deaths when assuming that 1984 fertility level converged with that observed in 2007 at the end of the projection period. In the same way, net migration for the projection period has been estimated at 915,000. In other words, This study estimated number of excess deaths ranges from **1.5 million** (open population) to **1.7 million** (closed population) when it is assumed that, for the counterfactual scenario, fertility level observed in 1984 remained unchanged for the whole projection period. When it is assumed that 1984 fertility level converged with that observed in 2007 at the end of the projection period the estimated number of excess deaths ranges from **1.6 million** to **1.9 million**.

Conclusion and implications

This study sought to investigate demographic consequences linked to the 1998-2004 DRC armed conflict. To do so, four different datasets were combined to derive missing demographic estimates needed to conduct cohort components projections based on war and non-war scenarios for both a closed and open population. The difference between the factual and counter-factual projections gave an estimate of excess deaths for the considered projection period. Methods presented here do have their limitations including poor quality for certain census estimates and UN Manual X key assumptions are very strong to derive specific estimates using indirect methods. Furthermore, recent surveys data do not provide enough information at subnational levels to further disaggregate results. For this reason, this study is still a work in progress. Current and future works aim at exploring not only the extent of excess death but also offering a framework upon which one can look beyond statistics, set to explore the perception and use of statistical findings on conflict related excess population loss by various actors and entities, including academics, public opinion and policy makers at all levels.

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