Fertility Patterns in Sub-Saharan Africa: Comparing Own-Children Method and Birth History Estimates

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Introduction

This study compares fertility estimates from birth histories and the own-children technique using 50 Demographic and Health Surveys (DHS) data sets for 25 countries in Sub-Saharan Africa. The two methods are fundamentally different. The birth histories focus on women and their maternity histories on specially collected surveys. The own-children method, on the other hand, uses living children as reported on the household roster of a population survey or census. Thus, it is reasonable to imagine, owing to these methodological differences, that their respective estimates will differ.

Background

Traditionally, birth histories have been used to obtain fertility estimates in developing countries starting with the World Fertility Survey (WFS) era in the 1970s and 1980s and continuing with the Demographic Health Surveys (DHS). However, birth histories have many limitations, including distortions by recall lapse, inaccurate birth date reporting and truncation errors. Also, birth histories require specially mounted demographic surveys that can be expensive to implement and, therefore, irregular in frequency (Retherford and Alam 1985; Potter 1977).

The own-children method is a viable alternative to birth histories. It has several strengths, including use of children under 15 years whose ages are relatively accurately reported and who are not prone to migration, and the Brass logit life table system known to yield robust estimates of childhood mortality in Sub-Saharan Africa. The method is also robust to errors in mortality, and facilitates the study of differential fertility in addition to giving trends for the 15-year period preceding a census or household survey. Finally, the method is appealing for its ability to use data invariably collected for non-demographic purposes (Cho, Retherford and Choe 1986). These advantages notwithstanding, the own children estimates are prone to distortions due to age misstatement and adoption of children. The latter can be particularly problematic in countries with high adult prevalence of HIV/AIDS. At any rate, matching children to their biological mothers can often be improved when a code for mother's line number is included. The DHSs routinely include this item. Thus, the primary source of information for the own-children method is the household schedule of any census or survey, where an attempt is made to link women age 15-64 years to their biological children aged below 15 years.

A few studies have in the past attempted to compare birth history and own-children estimates of fertility and found that they are generally consistent. Retherford and Alam (1985), for instance, compared eight World Fertility Survey samples and found consistent results between the pregnancy histories and own children fertility estimates. Cleland (1996) also found that both methods provide good indicators of fertility trends. Results from our study, by and large, corroborate these findings, particularly with regard to estimating fertility levels.

Method

For the own-children estimates, we use the East-West Center's FERT program to tabulate matched (own) children aged 0 to 14 years by the child's age and mother's age for women aged 15 to 64 years, both in single years of age. Un-matched children are re-distributed to the women in proportion to their matched (own) children at each age (sample mother-child matrix is shown in Table 1). The children are then reverse-survived to obtain the number of births by age of mother in single calendar years, for up to 15 calendar years prior to the enumeration date. Reverse survival is similarly applied to estimate the number of women by single years of age for the corresponding periods. Mortality from life tables for the reverse survival is obtained from the US Census Bureau's International data base that includes annual life expectancy at birth for all countries of the world. The calculations are initially made by single years of age for each full year before the survey as prescribed by the method. The estimates can also be categorized into three- and five-year period rates to minimize distortions due to age misreporting. The Birth History estimates are obtained directly from published reports accessibly online from ORC Macro's website [http://www.measuredhs.com]. The preliminary results are presented in the next sections.

Table 1. Mother-child matrix for estimating fertility rates based on the own-children method: Kenya, 1993 DHS

Woman's age	Total Women	Distribution of own children by age								
		0	1	2	3	.	.	.	14	Total
15	357	3	0	0	0				0	3
16	421	9	5	0	0				0	14
17	407	21	8	1	0				0	30
18	419	51	20	17	6				0	94
.										
.										
.										
64	56	0	0	0	0				0	0
Non-own children		32	64	120	119				308	2948
Total	9883	1179	1132	1253	1311				1142	18741

Results

Although these results are preliminary, they depict interesting patterns in as far as comparing fertility estimates based on the own-children technique and birth histories is concerned. For instance, Figure 1, taken from an earlier study (Opiyo and Levin. Forthcoming) illustrates the strength of the own-children method in highlighting fertility trends from a single-source data. Although jumbled somewhat, the estimates generally show that the Kenyan fertility transition started in early 1980s. The estimates differ from the stall discussed by other researchers based on birth history fertility estimates (see Bongaarts 2005; Westoff and Cross 2006). Similar results are available for other countries under study.

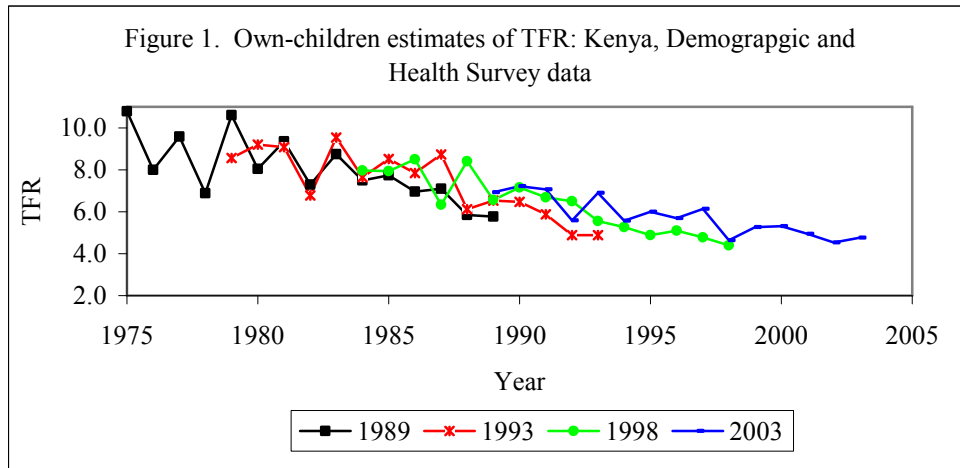Figure 1. Own-children estimates of TFR: Kenya, Demograpgic and Health Survey data

Figure 2 compares TFRs from the birth histories and the own-children technique for the periods 0-4, 5-9, and 10-14 years preceding the survey (with the extrapolated results for 45-49 year olds for the birth history estimate for 5-9 years before and the extrapolated results for the 40-44 and 45-49 year olds for the birth history estimate for 10-14 years before). The figure shows that the results are remarkably consistent, with both the levels and trends corresponding well.

Figure 2. Comapring TFRSfrom birth histories and own children method: Kenya, DHSs
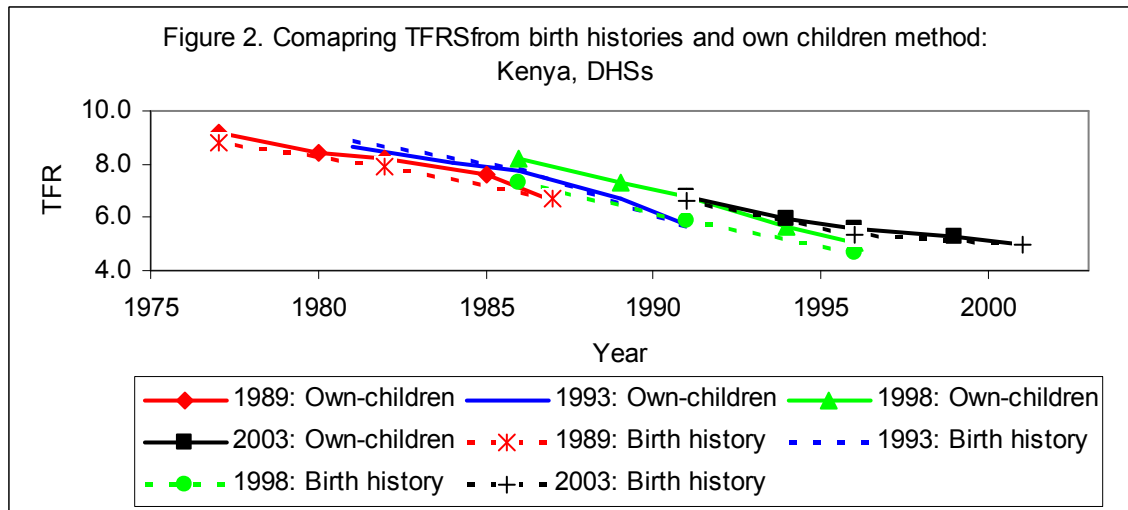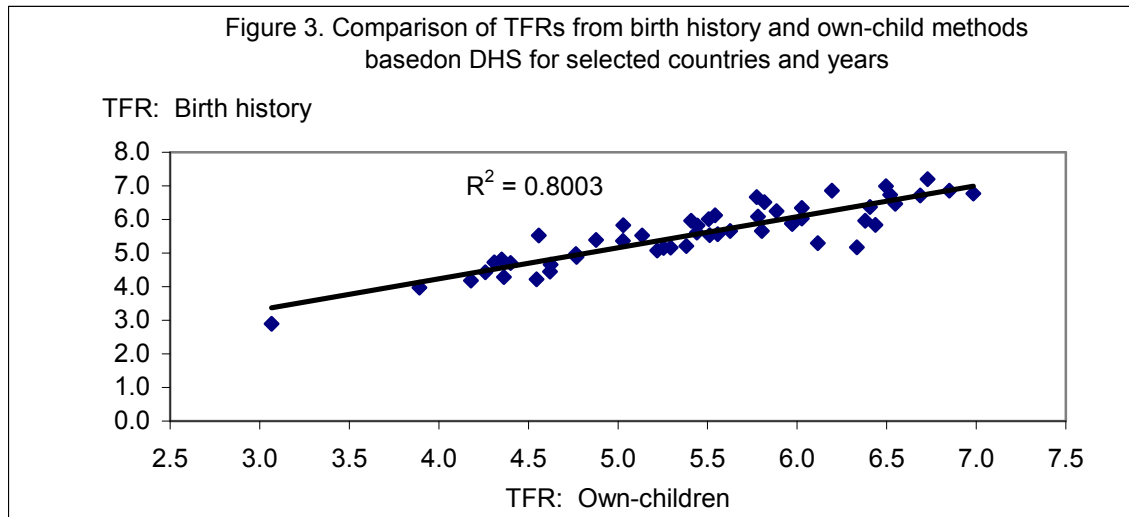
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Figure 3 presents a graphic summary of the relationship between the birth history and own-children TFR in the year of each survey. As expected, the correlation is strongly positive, suggesting remarkable consistency between the methods.

Figure 3. Comparison of TFRs from birth history and own-child methods basedon DHS for selected countries and years

TFR: Birth history

$R^2 = 0.8003$

TFR: Own-children

Finally, Figure 4 compares the age pattern of fertility based on both methods. The charts show, for each survey, the relationship between the age-specific estimates from the birth histories versus those from the own-children method. Here, remarkable differences are noted. The estimates for the 1989 Kenyan DHS, for instance, show non-negligible differences between the two methods. The own child estimates show much lower earlier fertility and higher late fertility. The differences could be the result of assigning children to older women at the expense of younger women. But this is not conclusive as the rest of the Kenyan surveys show fairly consistent patterns (the 1993 estimates are also different, but not quite like the 1989 ones).

Figure 4. Age Specific Fertility Rates, based on Own Child Fertility Estimates and Birth Histories, Kenya: 1989 to 2003
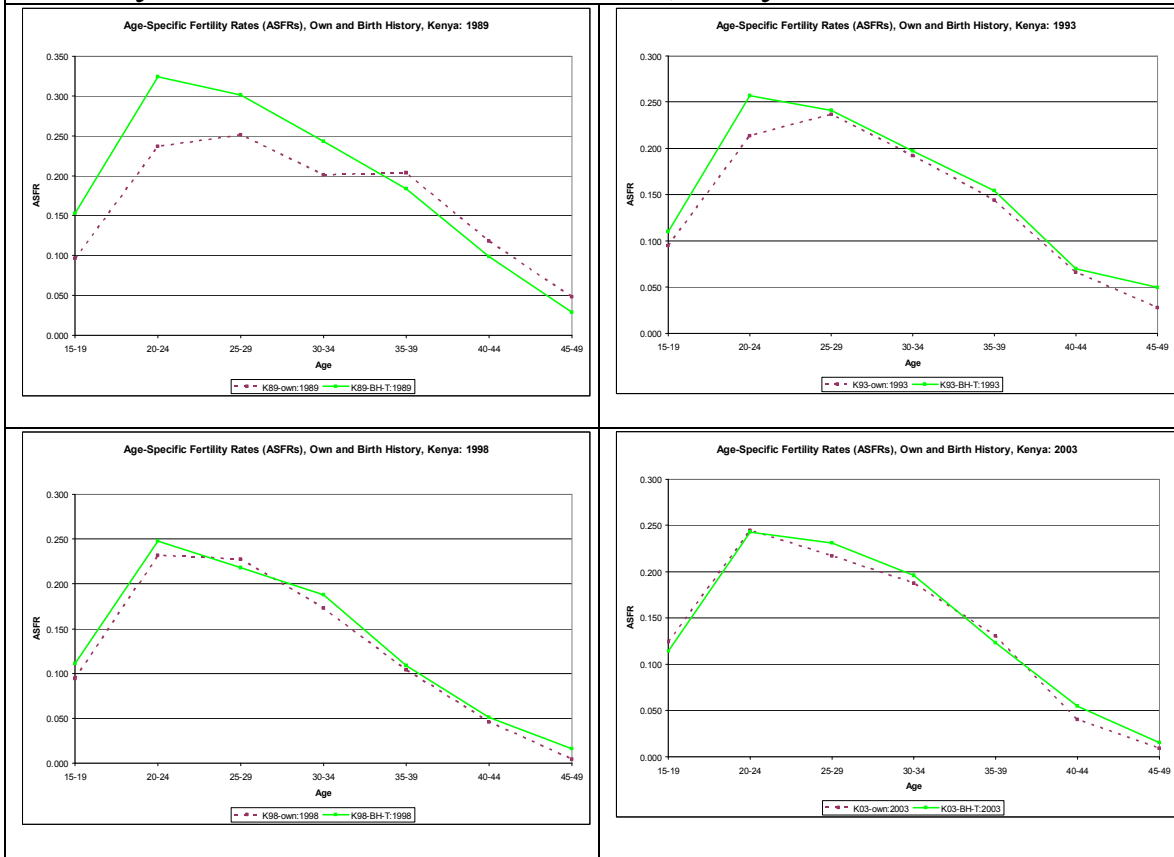
Concluding remarks

The study shows that fertility estimates from birth histories and the own-children method are comparable. However, the own-children method has an added advantage due to its ability to generate reliable trends from a single data source and its use of data invariably collected for purposes other than the measurement of fertility. This feature is important for developing countries with scarce resources for regular collection of DHS-type data. However, the estimates could greatly be distorted by age misstatement and widespread adoption of children. The latter could be substantial in the wake of high HIV/AIDS prevalence in Sub-Saharan Africa.

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