Lengthening birth intervals and their impact on the fertility transition in rural and urban East Africa

Description of topic:

The fertility transition in Sub-Saharan Africa has not proceeded at the pace seen in South America and in Asia. This has caused concern as rapid population growth will impact upon progress in population health, economic growth and environmental sustainability. However, fertility rates disaggregated by rural and urban area show significant levels of decline in the towns and cities of urban Africa, suggesting that transition is occurring in some distinct population groups. Surprisingly little attention has been given to this phenomenon.

This research aims to investigate whether there is an association between low fertility levels and long birth intervals in urban areas of East Africa. Analysis of birth rates in Sub-Saharan Africa has shown that fertility in urban areas is lower than that in rural areas by an average of 1.8 (Shapiro & Tambashe, 1999). Demographers have posited that rural and urban fertility differentials are an indicator of initial fertility decline in a population, and this research aims to contribute to this debate through an examination of birth intervals.

Child spacing practices were an important feature of fertility dynamics in many traditional Sub-Saharan African societies (Desgrées-du-Loû & Brou, 2005; Lesthaeghe, Ohadike, Kocher, & Page, 1981). Studies from a number of different populations have shown that short birth intervals are undesirable, as it is believed that pregnancy and breastfeeding are arduous to women's health. Traditionally, birth spacing was controlled by two mechanisms: prolonged breastfeeding and postpartum abstinence. Despite increasing urbanisation, cultural change and the use of contraception having loosened these traditional controls on birth spacing in many parts of Sub-Saharan Africa, birth intervals have been lengthening. Traditionally intervals were around thirty months (levels observed in natural fertility populations). However, in South Africa these have increased to more than six years and in Ghana, Namibia, Lesotho and Zimbabwe they have increased to almost five years (Moultrie, Sayi, & Timæus, 2010). It is now thought that long birth intervals may be a unique feature of the fertility transition in Sub-Saharan Africa (Caldwell, Orubuloye, & Caldwell, 1992; Kirk & Pillet, 1998; Moultrie, Sayi, & Timæus, 2010).

Understanding the pace of change of birth rates in both urban and rural areas is imperative if researchers and policy makers are to facilitate an accelerated decline in birth rates in a population. Traditionally, fertility transitions have been analysed through an examination of quantum changes; however, since birth spacing has been shown to be an important feature of fertility dynamics in Sub-Saharan Africa, it is important to have an insight into the tempo changes of fertility.

Theoretical focus:

This study develops from Timaeus and Moultrie's (2008) postponement hypothesis, which is a critique of the application of traditional demographic theory on reproductive intentions to the fertility transition in Sub-Saharan Africa. The analysis of fertility dynamics in non-African settings led to a dichotomous classification of women's fertility intentions: stopping or spacing. 'Stoppers' (also

termed ‘limiters’) are women who wish to prevent childbearing because they have reached their desired family size, whilst ‘spacers’ are women who wish to temporarily delay childbearing for the health of themselves or of their children (Bongaarts, 1992). Timaeus and Moultrie argue that neither of these motivations readily explains the emergence of the long birth intervals seen at all ages and parities in many Sub-Saharan African populations. They propose ‘postponement’ as the third category of fertility control, which they argue accounts for this trend. Women who ‘postpone’ births are delaying pregnancy for reasons that are unrelated to the age of their youngest child or to the size of their existing family. In fact, such women may not have decided whether they want another child or not. This research attempts to contribute to, and to bring more evidence to this debate.

Data and methods:

The study uses the retrospective birth histories from four East African countries: Ethiopia, Kenya, Tanzania and Zimbabwe. These countries were chosen because they have large rural-urban fertility differentials, large urban sample sizes and have had more than one DHS survey conducted.

The analysis of birth interval length will be done using a regression model approach outlined by Moultrie and Timaeus (Moultrie et al., 2010; Moultrie & Timæus, 2011). These Poisson regression models will be carefully specified because of complications which arise from the fact that family building is a selective process: between-couple levels of fecundity are heterogeneous. Fertility rates decline with birth interval duration as more fecund couples conceive and begin a new birth interval, while less fecund women experience longer periods of time before conception. Similarly, high parity women (who are selected on high fecundity) are prone to shorter birth intervals than women with lower parity (Timæus & Moultrie, 2011).

Furthermore, selection bias arises from the use of truncated birth histories. Many of the women interviewed in the DHS surveys have not yet come to the end of their reproductive lifespan, and the selection impacts related to heterogeneity of fecundity levels interact with the process of declining fecundity with age. For example, women who have reached a parity of three or more children at age thirty are likely to have experienced shorter intervals between their births and more likely to go on to have more children in the future. However, if all women who had reached a parity of three or more children by age fifty were interviewed, we would find that fewer of them had gone on to have more children and that the average birth intervals of these women would be longer than those measured twenty years earlier.

These biases can be controlled for using regression models; specifically, a method originally proposed by Hobcraft and others (Hobcraft & McDonald, 1984; Hobcraft & Rodríguez, 1992; Rodríguez & Hobcraft, 1980; Rodríguez, Hobcraft, McDonald, & Menken, 1984) and adapted by Timæus and Moultrie, (2010). Figure 1 illustrates how the regression models were built up:

Figure 1: Table showing stages of the birth interval regression model and the corresponding outcomes in understanding

Stage of modelling	Action	Outcome
1	Birth intervals are modelled with the controls for selection bias: I. birth order of the index child II. mothers age group at the beginning of each hazard segment III. grouped five year period at the beginning of each hazard segment IV. Time since mother's last birth	General assessment of birth interval length
2	Birth intervals are modelled with the controls for selection bias, allowing for an interaction between parity and calendar time	To determine whether there is evidence of family limitation i.e. a more rapid fall in fertility at certain parities than at others.
3	Ever use of contraception and ever marriage are added to model 2	Assessment of the effect of ever use of contraception and ever marriage on birth interval length
4	Measures of birth interval duration squared log of birth interval are added into the model and are interacted with calendar time	Identification of changes to fertility motives (spacing, stopping or postponing) over time
5	Ever use of contraception and ever marriage are allowed to interact with calendar time	To determine whether the effect of ever use of contraception or ever marriage has changed over time
6	The measure of birth interval duration is allowed to interact with the variable identifying type of place of residence	Assessment of whether postponement is occurring more in urban than in rural areas.

Expected findings:

Preliminary results (shown in figure 2) confirm what was expected: there is a significant difference in birth interval length between rural and urban areas, with the longest spaces between births being found in urban areas in all four countries examined. In all countries, except for Ethiopia, birth intervals have been lengthening in all types of place of residence, with the biggest change happening in urban areas.

Further analyses will be undertaken to allow me to present median birth intervals lengths and their distribution by five year time periods. This will enable me to comment on the details of the trends that occurring in the four countries. In particular I am interested in exploring the trends from Ethiopia since this is the only country where birth intervals have undergone negative growth. The Poisson regression coefficients will be exponentiated to allow me to present graphs showing the birth interval duration-specific hazards of giving birth by country, year and type of place of residence. These graphs will then be used to explore the durations at which fertility decline has been largest.

Figure 2: Table showing median birth intervals in months, by type of place of residence and country

Country	Type of place of residence	Year	Median Birth Interval (months)	Change
Ethiopia	Urban	1960-64	46.5	-4
		2000-04	42.5	
	Rural	1960-64	38	-3
		2000-04	35	
Kenya	Urban	1960-64	33	9
		2005-09	42	
	Rural	1960-64	28.5	5
		2005-09	33.5	
Tanzania	Urban	1960-64	38	4
		2005-09	42	
	Rural	1960-64	32.75	1.75
		2005-09	34.5	
Zimbabwe	Urban	1960-64	40.5	23.25
		2000-04	63.75	
	Rural	1960-64	32.5	11.5
		2000-04	44	

A detailed assessment of the output from the Poisson regression models will also be presented. This will allow me to examine the associations between birth interval length and mother's age, parity and calendar time, which will allow me to comment on whether there is evidence that postponement behaviours are occurring in urban and/or rural populations of these East African countries. Given what these preliminary results show, I anticipate finding that postponement behaviours are occurring in urban populations and possibly within some rural populations. This finding would have bearing on fertility policies for Eastern Africa; urban areas in Sub-Saharan Africa as a whole are predicted to experience the highest rate of urban growth in the world over the coming decades and suggesting that the dynamics of urban fertility will increasingly have a strong influence on national fertility levels (UNFPA, 2007). Moreover, as Timaeus and Moultrie (2010) argue, postponement brings with it the potential for fertility decline to be accelerated, in a way that birth spacing does not. If there is little evidence for family size limitation behaviours, then this may well explain the slow transition from high to low fertility in many parts of the continent. However, if the trend of birth interval lengthening continues, then populations will not return to high fertility levels.