

The Incipient Fertility Transition and Women's Labor Force Participation in Sub-Saharan Africa, 1991-2005: A Multi-method Analysis

ABSTRACT

Sub-Saharan Africa has experienced an expansion of schooling, accompanied by delays in marriage and lower fertility. These trends stand to boost women's employment prospects and foster further fertility decline through a variety of plausible mechanisms. But the evidence has been spotty. Building on the diversity of recent fertility changes within countries and taking advantage of repeat nationally representative and comparable DHS surveys, we attempt a large-scale historical analysis to provide an early assessment of the status of the transition in 21 countries. To evaluate the prospects for further declines in the region, we use multiple techniques to quantify the magnitude and relative effect of fertility on changes in within countries. Results across the region are mixed, with the evidence on both the magnitude and relative fertility effect being positive in some countries and null or negative in others. Implications for the transition and inequality in the region are discussed.

INTRODUCTION

The last three decades have seen a global expansion of schooling¹, especially female schooling across the developing world (Hewett and Lloyd 2003; UNICEF 2003; World Bank 2007). Worldwide, this expansion in schooling has been accompanied by changes in marriage and fertility behavior (NAS 2005; 2003; DHS 2007)². For instance, as forerunners in the African fertility transition, Botswana, Kenya and Zimbabwe registered declines of 15-25% as early as the

¹ Beginning with schooling, the secondary school enrolment rate for African women rose from below 5 percent in 1970 to above 14 percent in 1985 and to 30 percent by 2005 (World Bank 2007; Hewett and Lloyd 2003; UNICEF 2003). Similar achievements have noted relative to the African male, with the female/male ratio in secondary educational attainment rising from an average of 0.67 in 1970 to about 0.80 in 1985, then to 0.90 in 2005 (World bank 2007).

² For developing countries as a whole, the proportion married in the 15-19 years age group declined from 27 percent in 1970-1989 to 21 percent in 1990-2000 (NAS 2005). Despite cross-country variation, the NAS (2005) notes that the decline was especially dramatic in the Western/Central African region, where the percentages fell from 53 to 38 percent, confirming earlier reports of delayed marriages in the 1990s (Westoff 1992). Changes are also evident in non-marriage rates. At the time of the start of this research, in most of the 24 African countries with repeat surveys collected by the Demographic and Health Surveys (DHS) Program (DHS 2007; 2008), the proportion of never-married women among the 40-49 year olds has steadily increased in many parts of the region.

1980s (Arnold and Blanc 1990). It is noteworthy that these declines surpass the conventional gauge of a 10% decline as indicative of the onset of a transition (Bongaarts 2006). Lower but notable declines in the 1990s have been documented in other culturally different settings: Southwest Nigeria (Caldwell, Orubuloye, and Caldwell 1992) and Senegal and Sudan (Westoff 1992). Recently, Makinwa-Adebusoye (2001) reported the onset of a transition in Cote d'Ivoire, Ghana, Nigeria, Rwanda, and Zambia.

These trends, to be precise, declining fertility is expected to boost women's employment prospects, which in turn, should foster further fertility decline through a variety of plausible mechanisms. Some of these effects have been recognized in the theoretical literature to work through competition for mother's time, increased access to contraception, growing propensity to trade quantity for quality, or greater leverage in family planning decisions (Blake 1981; Caldwell 1982; Eloundou-Enyegue 1997; Eloundou-Enyegue and DaVanzo 1997; Langlois and Colliver 1962; Mason and Palan 1981; Stycos and Weller 1967). Yet, the impacts of these demographic trends remain understudied in developing countries. Despite the variety of cogent arguments about why African fertility transitions could yield socioeconomic dividends at the individual and national levels, the evidence has been spotty. This paucity itself reflects a number of limitations in theory, data availability, research design, and substantive focus.

The purpose of this research is to address some of the above limitations. We take advantage of the continued accumulation of nationally representative and comparable DHS to provide an early assessment of the fertility transition in this region. Building on recent changes within countries and the diversity of national experiences, the study attempts a large-scale empirical analysis to document the status and evolution of contemporary African fertility transitions between 1991 and 2005. To evaluate the prospects for further fertility declines in the region, I examine the effect of fertility on women's labor force participation in the region within the same period of study in terms of both its size and its relative contribution to observed employment changes. Specifically, I quantify the relative contribution of changes in individual fertility versus changes in TFR (i.e., changes in the fertility transition) or changes in country-

specific processes on which employment opportunity depend to changes in women's employment.

Quantifying the relative contribution of fertility within African labor markets is timely given the reported stalls in the transition in some countries (Bongaarts 2006). Consistent with Bongaarts (2006), the most recent DHS trend data (DHS 2011) indicate that fertility rates increased in Kenya in 2003 after a notable decline from 5.4 in 1993 to 4.7 in 1998. Similarly, fertility rates stalled in Ghana between 1998 and 2003 at 4.4 after an appreciable decline from 5.2 in 1993 (DHS 2011). The lack of adequate country progress in the region on the Millennium Development Goals (MDGs), the United Nations blue-print for development by eradicating poverty through, among others, gender inequality in schooling and employment has been reiterated in policy arenas (United Nations 2005; UNICEF 2008). Large-scale systematic research to inform policy on these fronts is therefore imperative.

THEORY, FERTILITY AND EMPLOYMENT

The theory of the economics of fertility (Becker 1992) and the maternal role incompatibility thesis (Collver and Langlois 1962; Mason and Palan 1981; Stycos and Weller 1968) offers two theoretical frameworks for understanding how fertility relates to employment. The maternal role incompatibility thesis is premised on the conflict between childrearing and paid work. Because childrearing remains primarily the responsibility of women, the theory posits that women are less likely to continue employment following childbirth (Collver and Langlois 1962; Youssef 1972). Thus, child bearing/rearing is associated with less labor market activity for women due to temporary or longer withdrawals from employment (Collver and Langlois 1962). Proponents predict that with growth in labor demand stemming from modernization and industrialization, women will reduce their fertility to take advantage of paid employment, which in turn, will lead to further fertility declines at the national level.

Others theorists have qualified the thesis, suggesting that it only holds where conflict between time demands of working and mothering arises (Mason and Palan 1981; Stycos and Weller 1968). Mason and Palan (1981) have gone further to elaborate the sources of this conflict. For them, mothers' employment is determined by both the structure and organization of women's

work as it relates to norms regarding childrearing and other household responsibilities (Mason and Palan 1981). These qualifications are important for this study because the time demands of childrearing may not rest squarely on mothers but spread across family members or networks.

Contrasting the role incompatibility thesis that emphasizes non-economic penalties, the economics of fertility theory places a higher premium on economic penalties arguing that women's rising economic activity increases the relative cost of children which in turn reduces the demand for children (Becker 1992). Applying this thinking in African settings, childbearing costs for employed women are expected to induce fertility transition (Becker 1992). While Becker's economic theory of fertility has wide appeal in social science research because of its ability to explain a wide range of family transformations, it has not been systematically evaluated in the African context.

PAST EVIDENCE

The relationship between fertility and employment is central to demography precisely because of its impact on the fertility transition and women's socio-economic status in developed and developing regions alike. Accordingly, it has been studied extensively at both the micro³ and macro⁴ levels in developed countries. While the fertility-employment relationship at the micro-level in Western countries has been largely negative, albeit recent evidence of a gradual reversal in the direction from macro studies (Brewster and Rindfuss 2000), the micro-evidence on developing countries has produced mixed findings. Consistent with the developed country evidence, some researchers find the association between fertility and employment to be negative

³ The micro-level evidence, notably from the U.S. (Cramer 1980; Desai and Waite 1991; Klerman and Leibowitz 1999; Kravdal 1992; Leibowitz and Klerman 1995; Morgan and Rindfuss 1999; Presser 1989; Rindfuss and Brewster 1996; Spitze 1988) is consistent with the role incompatibility thesis (Colliver and Langlois 1962; Mason and Palan 1981; Stycos and Weller 1967), with the overall evidence from these studies indicating a negative relationship.

⁴ Similarly, macro-level studies employing cross-country analyses of fertility employment patterns abound in developed countries (See Brewster and Rindfuss 2000; Rindfuss and Brewster 1996; Rosenfeld 1996; Rosenfeld and Birkelund 1995). This macro evidence is not quite consistent with the micro evidence on the relationship. For instance, the study by Brewster and Rindfuss (2000) suggests that, until in the early 1980s, the association had been negative from the 1980s on, the sign has turned positive. The apparent broken negative relationship has been attributed to variation in women's work patterns arising from institutional factors including attitudes toward childcare, childcare availability, and leave policies (Brewster and Rindfuss 2000; Rindfuss and Brewster 1996). But this inverse association is not universal or automatic. In Italy, and to some degree, Spain and Greece, both fertility levels and employment are low (Boca 2002), presenting a paradox. For different interpretations of the changing direction of the fertility employment link in western settings see Kogel (2004).

(e.g., Connelly, DeGraff and Levison 1996 for Brazil; Rosenzweig 1976 for the Philippines; Torres and Mendez 2003 for Colombia). Others find no relationship (Stokes and Hsiah 1984 for Taiwan) while Gurak and Kritz (1982) find no relationship in the short term but a positive one over the long term.

Shifting to this study's region of focus, a handful of empirical studies using SSAn data (Buguy 2009; Lokshin, Glinskaya, and Garcia 2000; Shapiro and Tambashe 1997) provide evidence on the relationship at the micro-level. Lokshin et al. (2000) examine, beyond other factors, the connection between employment and cost of child care in Kenya and find that fertility indirectly (based on increases in institutionalized childcare costs) impacts employment negatively, lending support to the incompatibility thesis. Shapiro and Tambashe (1997) examine the linkages between schooling, employment, and lifetime fertility differentials in Kinshasa, Democratic Republic of Congo. They observe modern sector workers - operating through education - displaying significantly lower fertility than informal sector peers (i.e., a work fertility conflict) and conclude that both education and employment status will be critical to a sustained fertility decline. The evidence from the Beguy (2009) study is not inconsistent with that reported by Shapiro and Tambashe. In examining the impact of employment on fertility in two culturally different settings - Dakar (Senegal) and Lome (Togo) - Beguy reports a role conflict in Lome but not in Dakar: he finds a negative relationship between female paid employment and fertility in Lome but no relationship in Dakar.

Sharply contrasting the industrialized world, comparative evidence on the work-fertility relationship in developing countries as a whole is rare, with the only evidence based on the United Nations analysis of the World Fertility Survey data of the 1970s (United Nations 1987; Lloyd 1991)⁵. But this evidence is now dated. A recent cross-country analysis of the effect of fertility on employment conducted by Bloom et al. (2009) is consistent with the United Nations (1987) results. However, this latter study is global, including both developed and developing countries. Against this background, large-scale literature on the work-fertility relationship has

⁵ The evidence that emerged from these data, like that coming from industrialized nations, generally lends support to the incompatibility thesis, with the fertility employment relationship reported to be generally negative in Latin America, Asia and Oceania in modern and mixed occupational categories (United Nations 1987). However, the fertility employment relationship was found to be much weaker in SSA. Given that SSA was and still is considered the least developed of the regions studied, the study concluded that the fertility-employment relationship as well as the mediating factors of marriage, schooling, and to some degree, women's status, is dependent on level of development.

been sparse in Africa, partly due to a perceived weak link between the two variables and partly due to until recently, data scarcity.

Hypotheses

Against the general context of diverse national experiences of social, demographic and economic duress in SSA, I formulated three hypotheses with respect to:

Fertility

H1: The effect of individual fertility has had some influence on changes in women's employment.

H2: However, any employment dividends from reduced fertility will be stronger in the skilled than the overall sector.

Contextual variation

H3: The effect of individual fertility will be stronger in contexts of low fertility coupled with high employment than in contexts where the transition co-exists with poor employment opportunities.

Relative contribution

H4: The relative contribution of changes in individual fertility will be greater than that of the fertility transition or generalized country processes of social change.

ANALYTICAL FRAMEWORK AND CONTRIBUTION

The existing few studies on the question of how fertility relates to employment in SSA have generally indicated the existence of a work family conflict for mothers. Such evidence is quite contrary to the evidence from earlier studies that show no clear-cut link between fertility and employment and provide valuable insights to our understanding of how the relationship in question. At the same time, the research design and methodologies used in each of the reviewed studies differ and coupled with differences in study timing a comparison of the findings can prove difficult. For instance, Beguy (2009) measures fertility by pregnancy spacing while Shapiro and Tambashe (1997) measure fertility by number of children ever born and Lokshin, Glinskaya, and Garcia (2000) with yet another different measure: cost of childcare. Similarly, different forms of employment are considered by these studies.

This study's contribution to this literature on the subject is unique in several respects. First, in examining recent data on the largest number of African countries than previously done, this study provides a *first* and *comprehensive* assessment of the question of how the incipient fertility transition in the region has impacted women's employment prospects. The use of this large number of countries partly addresses questions about *contextual* variation. Second and tied to first contribution, it is the first large-scale study of its kind to test the applicability of the role incompatibility hypothesis in the region, thereby extending the Western based theory to the African context. Third, it permits *comparison* and *generalization* of the evidence through the use of comparable national representative data from the same source, collected around the same time periods, and replicating the entire analysis within all the countries. Using a common data source from the DHS Program that employs standardized research designs and methodologies that have undergone considerable improvement over the years (DHS 2007) across the developing world helps overcome many concerns over differences in *data*, *study design*, *conceptualization* and *definition* of key variables. Fourth, it considers a rich set of individual and household correlates that bear on women's employment to permit isolating the direct effect of fertility on employment, and like the Shapiro and Tambashe's study, differentiates the overall from the skilled sector,.

The fifth contribution of this study is in the realm of methodology. Quantifying the gains from social interventions has been particularly difficult due to unavailability of data needed to establish causality and the possibility of reverse causation (Cramer 1980; Moffitt 2003; 2005). Excluding Beguy's (2009) study, the reviewed African evidence on the question comes from cross-sectional data. That cross-sectional evidence is insufficient to infer causal influences have been well established (Thornton 2001), especially in the case of cross-country correlations. Additionally, many of the potentially influential factors are not easily measured⁶. These unmeasured factors can complicate analyses, with failure to account for their influences leading to different interpretations/conclusions (Axinn and Thornton 1992; Jah 2007; 2011). Further, macro-level analyses assume compositional homogeneity across individuals while micro-level

⁶ Un-measured influences can derive from individual attributes critical to labor market success such as work experience (Mincer 1974), economic or family aspirations and how these affect work propensity. Unmeasured community attributes can include: variation in economic opportunities arising from broader national policies, earnings differentials across occupation sectors, labor market discrimination, norms, especially as it relates to the organization of paid work (Mason and Palan 1981) and societies' changing attitude toward women's evolving household and economic roles, all of which are hard to measure.

analyses ignore country-specific influences. A reliance on either the micro or macro level is unsatisfactory (Eloundou-Enyegue 2011) with interpretations based solely on either likely to lead to ecological fallacy (Robinson 1950).

Three methodological attempts are made to address these empirical concerns. The first is through the use of historical data to address the issue of temporal fallacy, thereby partly addressing concerns over causality. The second is through the triangulation of three analytical methods (elaborated in the methods section) to refine interpretation and enhance confidence in the findings. Third, in recognition that women's employment is governed by both individual characteristics and the institutional context (Eloundou-Enyegue 2011; Schockaert 2005), the study marries the macro and micro approaches in three different ways: 1) analyzing individual-level data within each country but using country-period as the unit of analysis and aggregating evidence to the country level; 2) classifying these countries into employment regimes on the basis of country's average fertility and employment profiles; and 3) most importantly, isolating the relative contribution of individual fertility effects from the effects of the fertility transition and broader processes of social change on employment changes through regression decomposition. Thus, generalization without loss of contextual specificities is achieved.

DATA

This study takes advantage of the availability of multiple waves of comparable and nationally representative cross-sectional data from the DHS Program to embark on a large scale study. One distinctive feature of the study is the construction of a large *historical* data set containing over 404,000 cases to provide analytical rigor and enhance interpretations to document change and compare the historical experiences of 21 SSA countries. The DHS female respondents' files were used to construct the data set containing information on women's schooling and marriage, fertility, and labor market outcomes, as well as their background characteristics. One caveat in this dataset is worth noting. While it is interesting to examine the demographic outcomes and employment experiences of both women and men, the male information available is mostly derived from a sub-sample of men (the husbands/partners of married women only) and therefore does not provide a representative sample of the population of men.

This historical data covers two periods within each country. The first period spans 1991 to 1997, while the second spans 1997 to 2005. Given the study emphasis on *historical* changes

and data *comparability*, only countries with repeat surveys conducted from 1991 onwards. Older surveys were not standardized across countries and some key variables are measured differently than from the 1990s on. This selection criterion yields a sample of 21: eight in West Africa (Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger, Nigeria, and Senegal); two in Central Africa (Cameroon and Chad); and eleven in Eastern Africa (Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Namibia, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe). Southern Africa is not represented because the countries do not meet the above criterion. Excluding this latter region, the countries represented provide adequate representation of the continent.

MEASURES

The study's main goal is to estimate the contribution of fertility transitions versus general processes of modernization to the changes in women's labor force participation since 1990, net of key correlates of employment. A limitation worth noting here is that although the data constructed and analyzed is historical, all the dependent, independent, and correlates are fixed measures from each of the two survey periods used in that they refer to the respondent's current status on the particular measure. This is an unavoidable caveat given the cross-sectional nature of the DHS surveys.

Dependent Variable

The dependent variable in the analyses is employment status in the (1) overall and (2) skilled occupation sectors. Overall employment is measured dichotomously by paid employment in any sector, coded "1" with unemployment or engagement in agricultural activity or unpaid family-work as the reference category and coded "0". Skilled employment is also measured dichotomously by the proportion of employed individuals in professional, technical, and managerial as well as in skilled manual work and coded as "1". Thus, conditional on being employed, this outcome models skilled economic activity against all other non-agricultural paid participation, the reference (coded "0")⁷. On the other hand, skilled employment denotes more regulated occupation types with greater human capital prerequisites; it should therefore provide a closer measure of formal work. A finer occupational distinction within formal and informal

⁷ Given that overall employment includes all non-agricultural paid work outside the home and makes no distinction between occupation sectors it should have lower human capital requirements for access and success. And since the African public sector, more than the informal sector, is dwindling, overall employment should closely resemble informal work.

sectors is desirable, particularly in the latter sector where women are over-represented. However, the occupation classification adopted by the DHS precludes such level of distinction.

Explanatory Variable

Fertility is the main explanatory variable in this study. It is measured continuously, by the number of living children born to a respondent. A quadratic term was also added to address possible non-linearity. Although this measure adjusts for mortality - making it preferable to “total children ever born to a woman”-- it does not distinguish between ages of children. Thus, when used to estimate the relationship between fertility and employment, it assumes that children of all ages influence mother’s opportunity to work in the same way. This assumption overlooks the incompatibility theory that posits children of pre-school age to pose greater work-childrearing conflict than older children. The study partly addresses this concern in the analyses by controlling for “whether the respondent experienced a live birth a year prior to the survey”.

Correlates

Drawing from the theoretical and past studies reviews, the study controls for several correlates of employment, reflecting four sets of influences that are likely to affect labor force participation.

Four sets of correlates reflecting basic information⁸; family composition/structural characteristics⁹; economic constraints and the need to work¹⁰; and cultural attributes¹¹ were controlled for.

⁸ The basic correlates include age and its quadratic term, schooling and its quadratic term and marital status. Controlling for age, beyond its direct effect on employment, indirectly adjusts for experience which is not asked in the DHS surveys. It is measured by the number of completed years lived by the survey year.

⁹ Family characteristics include four variables. The first measures whether the respondent had a birth in the year before the survey. As indicated earlier, a recent birth event is more relevant to women’s employment transitions than family size, at least from a time competition perspective. On the other hand, the presence of other female adults in the household is expected to relieve some of this time conflict thereby facilitating a mother’s outside paid work and is therefore controlled for (Gurak and Kritz 1996). The third correlate in this group is whether or not the respondent is wife of the household head. Being the wife of the household head is expected to be inversely related to a woman’s paid work for several reasons, including household responsibilities, husband’s economic support acting as a deterrent, and husband’s opposition to her outside work. While urban settings offer greater work opportunities than rural ones, residence in an urban location can reduce potential childcare and household help from extended kin. Its effects can therefore be either negative (reflecting household structural effects) or positive (reflecting community effects). The fourth correlate therefore controls for whether she resides in an urban versus rural setting.

¹⁰ Economic constraints include four variables. Two of these variables measure husband’s education and work status. Both variables can work in either direction, negative or positive: discouraging women’s work where spouse’s educational and occupational status is high enough to provide for family economic needs or fostering greater openness to women’s changing family and economic roles and therefore support wife’s economic activity. The third control, whether respondent’s spouse resides with her, is expected to reduce economic constraints on the mother and her need to seek paid employment. But sub-regional variation in the effect of co-residential status of husbands

METHODS

The study adopts an innovative analytical approach in which the unit of analysis is *country-period* (to determine change across the two periods studied) even though input data are *individual-level*. As alluded to earlier, two levels of analyses: macro and micro are conducted. The macro-level analyses focused on cross country correlations at three levels of successive complexity.

Cross Country Correlations

In line with the existing aggregate evidence in the socio-demographic literature, a standard cross country correlation between fertility and employment was first attempted followed by a cross country correlation between changes in the two variables over the period under study (1991-2005). Lastly, country specific correlations of the relationship were done over the same period.

Employment Regimes

Because cross country associations tend to hide country specific factors and given the large number of countries studied and their diversity, countries were classified into four employment regimes, depending on countries' aggregate level of employment and TFR. For each of these two aggregate variables, countries are ranked in increasing order. A cut off point around the average for each variable is then applied with the aim of obtaining reasonable number of countries under each regime. While the cut-off point in each case is arbitrarily determined, the regime classification roughly reflects various stages in the fertility transition as it relates to employment. The outcome of the classification is discussed in detail in the results section.

Micro-level Analyses

stemming from differences in family systems (Caldwell 1987) is expected. The fourth variable is family socio-economic standing, measured by a socio-economic index derived from a factor analysis of aggregated household amenities and assets. An inverse association is presumed to exist between the index and informal employment in situations where returns to human capital are low. Contrastingly, high family status is presumed to be influential in women's access to prestigious or formal occupations.

¹¹ The cultural set of correlates is measured by two variables: the respondent's ideal number of children and her approval of family planning. These variables are intended to capture changing perceptions. Again, like husband's co-residential status, these measures are expected to vary by family system across countries/sub-regions.

While the country and regime aggregates account for some of the country specificities, they as well as the macro-level correlations mask compositional differences at the individual level. Accordingly, micro-level multivariate regressions were conducted to further refine analyses. These micro-level analyses proceeded in three stages, employing three different analytical techniques of increasing complexity: logistic regressions, fixed effects modeling and regression decomposition.

Ordinary Logistic Regression. Given the dichotomous nature of the two employment outcomes, logistic regression was used in the initial estimations of the size of the fertility effect. In the first stage, ordinary logistic regression was used to estimate the effects at the bivariate (i.e., without considering any controls) level. Next, the gross or main (controlling for only the basic correlates) and net (controlling for the various set of correlates) fertility effects were estimated sequentially under four models. The first model, model 1 estimated gross fertility effects by including only the basic correlates, namely fertility squared, marital status and schooling and its squared term). Model 2 additionally controlled for family/household characteristics, model 3 further controlled for economic constraints of the household and model 4 incorporates the cultural attributes thereby controlling for the full set of correlates. This serial incorporation of correlates permits one to monitor the stability of the fertility effect to the presence of successive controls. Consequently, each model was more complex than its predecessor as it included additional controls as the regression formula in equation 1 shows.

$$\text{Log } Y/(1-Y) = \beta_0 + \beta_f F + \beta_b B + \beta_h H + \beta_e E + \beta_c C + FE + \varepsilon \quad \text{Equation 1}$$

where $\text{Log } (Y/(1-Y))$ is the odds of being employed; F is the measure for fertility; B the measure for the basic correlates; H the measure for the family composition/household structural correlates; E the measure for the economic constraints correlates; C the measure for the cultural correlates; ε measured the error term and the β s were the regression coefficients, with β_0 being the intercept. FE reflects the fixed effects model, outlined below.

Fixed Effects Modeling. The logistic regressions used thus far cannot address the potential influence of unmeasured fixed effects of individuals/families. Model 5 therefore re-estimates Model 4 without any additional controls but by introducing a statistical procedure called PHREG (Allison 1996) as indicated by FE in equation 1. Allison (1996) shows that this

fixed effects statistical refinement that uses the PHREG procedure in SAS software adequately controls for unmeasured fixed factors of individuals (i.e. unobserved heterogeneity across individuals). Further, it permits a comparison of the ordinary regression estimates with the PHREG estimates to establish the extent to which failure to adjust for unobserved fixed effects of individuals can influence the substantive conclusions of the study.

Regression Decomposition. While logistic regression estimates the cross-sectional and absolute magnitude of the fertility effects on employment, decomposition methods are used to estimate these effects in relative terms, allowing one to quantify the relative contribution of fertility as opposed to other factors to employment changes. The total change in women's employment since 1991 is derived from predicted employment logits using the regression coefficients. Regression decomposition is then used to apportion this total change within each country into three components according to equation 2: changes in the effect of the transition (average fertility or TFR effect); changes in the returns to fertility (i.e., individual effects of fertility) and changes in the effects of the baseline. This baseline component reflects country-specific processes that govern women's employment opportunities not included in the analysis, essentially the residual.

$$\Delta Y = \Delta\alpha + (\bar{X} * \Delta\beta) + (\bar{B} * \Delta X) \quad \text{Equation 2}$$

Where ΔY is the total change in employment over the two periods of study; $(\bar{X} * \Delta\beta)$ is the component due to changes in the individual fertility effects; $(\bar{B} * \Delta X)$ is the component of the change due to changes in the transition or average fertility (TFR) levels; and $\Delta\alpha$ is the component stemming from changes in the baseline employment opportunities.

RESULTS AND DISCUSSION

Study countries were classified into four regimes on the basis of their TFR and employment profiles namely: high fertility-low employment (HFLE); high fertility-high employment (HFHE); low fertility-low employment (LFLE); and low fertility-high employment (LFHE). Countries under the HFLE and LFLE fall on either end of the fertility employment continuum in the sense that the former have yet to initiate its transition as opposed to the latter where the transition is relatively advanced. On the other hand, the HFHE and LFLE regimes are intermediate to the former two by having initiated one but not both aspects of the transition. The

majority of the sample falls under the HFLE (38%) and the LFHE (29%) while the HFHE and LFLE regimes respectively house 19% and 14% of the sample.

For each regime, I weight both the descriptive figures and the micro-level multivariate coefficients with the respective country survey sample size and time interval between surveys to account for population distribution as well as temporal variation. Throughout the entire section, results are presented according to the four regimes. These results, aggregated to the country and regime level therefore reflect various stages in the fertility transition as it relates to employment and provide macro-level evidence on the relationship.

[Table 1 here]

STATUS AND PATTERNS OF AFRICAN FERTILITY REGIMES

Table 1 reviews overall levels and trends in TFR (panel 1) and women's labor force participation (panel 2). The bottom row of panel 1 shows that fertility has declined for the region as a whole, from about 6.3 children in the first study to 6.1 children per woman in the second study, suggesting the onset of a gradual transition in the region. Similarly, mirroring the overall regional trends, fertility has declined in all four regimes and within most countries during the two study periods. Yet within each regime, there are country exceptions to this generalization. From the HFLE regime to the LFHE regime, fertility rates have increased in Uganda, Mali, Niger, Mozambique and Nigeria with Niger exhibiting the highest fertility rate of 7.2 in the region recent times. Nonetheless and despite substantial country diversity, these results indicate that an incipient fertility transition is underway in the region. In the paragraph that follows, I examine levels and trends in employment within these regimes.

Panel 2 of the table gives the levels and trends in women's overall and skilled labor employment by fertility regimes. For the region as a whole, women's employment levels have declined with both the overall and skilled occupation sectors between the two studies. The same picture generally holds, with a few exceptions, at the regime level as well as for countries across regimes. However, three important trends are visible throughout the paid labor force. Declines in women's overall employment are most dramatic under the HFLE regime, partly due to lower employment opportunities for the regime. On the other hand, declines in women's skilled employment are steepest under the LFLE regime. Thus, in spite of the clearly discernible internal regime diversity and contrasting the growing heterogeneity with respect to the fertility transition, countries are converging in their employment profiles. It remains to be seen whether the

observed declines in fertility have translated into improved employment prospects for women. These relationships are examined in subsequent chapters beginning with macro associations.

[Figures 1a-b]

MACRO-LEVEL RELATIONSHIPS

Figures 1a-b present country-level associations between total fertility rates and women's overall and skilled employment, respectively, across the 21 sampled countries and two studies (1991-2005). As expected, fertility is inversely related to both overall employment (figure 1a) and skilled employment (figure 1b). But the relationships are weak as indicated by the low R^2 s suggesting that influential factors have been omitted. A finer understanding of this cross-country association can be achieved by examining the correlation between trends in both variables. Results suggest visible differences in the relationship between the two sectors. As expected, it is positive in the overall sector (figure 1c) and negative within the skilled sector (figure 1d). These findings imply that fertility facilitates women's overall employment but hinders their skilled sector employment. Even more detail can be obtained by looking at this association within individual countries (figure 1e). The figure shows clear-cut variation across countries, as reflected in the diversity of the lines in terms of timing, slope, interval, and direction of the changes. Thus, any inference from these macro findings to individual employment behavior would ignore these historical and cross country variations, leading to historical (Thornton 2001) and ecological (Eloundou-Enyegue 2011; Robinson 1950) fallacies. These variations in contextual issues are addressed in the multivariate micro-level analyses.

[Figures 1c-e]

MICRO-LEVEL FINDINGS

Historical Changes in the Bivariate Effects of Fertility

Table 1 (panel 3) shows the bivariate associations between fertility and employment. At the regional and regime levels, estimates show positive returns in both the first and second studies for the overall as well as the skilled sectors. With a few exceptions (notably Rwanda and Ethiopia where the effects have been negative throughout), a similar pattern is visible within regimes at the level of country. This evidence contradicts the macro associations, further highlighting the limitations of a reliance on macro-evidence to infer individual behavior. However, although little change occurred over the years in both sectors, the effects are much weaker in the skilled labor market. At the very least, these bivariate effects hint that fertility may

not, surprisingly, interfere with skilled employment; surprising because this is the sector where conflict between mother and worker roles is most likely to exist. Yet, the associations are bivariate and do not control for potentially influential correlates.

[Table 2 here]

Levels and Changes in the Net Effects of Fertility

Overall Employment

The results presented in table 2, panel 1 clearly indicate that fertility is unrelated to women's employment behavior in the overall sector in the early 1990s (i.e., first study), supporting the received view and the earlier evidence on the question (United Nations 1987). These results are irrespective of regime and most of the estimated models. Restricting interpretations on the final fixed effects models, model V, a few countries deviate from this broad picture. In Zambia and Nigeria, fertility enhances women's employment while it depresses it in Zimbabwe. Conversely, examination of the recent associations under panel 2 reveals that the fertility effect has grown more negative with time in most countries across all regimes (Madagascar, Tanzania, Uganda, Benin, Senegal, Cameroon, Mozambique, Cote d'Ivoire, Ghana and Zimbabwe). On the other hand, fertility remains unrelated to women's overall sector employment in Burkina Faso, Chad, Zambia, Mali, and Niger as well as in Nigeria where it was initially negative.

Three points are worth noting in terms of women's overall employment. First, in the early 1990s, African mothers were generally no less likely than non-mothers to be employed in the overall sector. In recent times, however, being a mother has become an impediment to accessing the overall sector in the majority (60%) of the countries sampled. Second and interestingly, the historical analyses revealed that fertility has become unimportant in most countries where it initially mattered, further buttressing the value of historical analyses. Third, the historical analyses combined with the serial incorporation of correlates have also signaled a growing stability of the fertility variable to the presence of correlates. Inconsistent with recent studies where conflict is reported to occur only in more restrictive occupations, this third statement suggests the growing significance of fertility in even the overall sector. The overall sector evidence emphasizes the importance of historical over cross-sectional analyses and of marrying micro with macro approaches, evidence that would have been clouded had one relied on only cross-sectional or one level of analysis. Below, I examine the marriage employment relationship within the skilled sector.

[Table 3 here]

Skilled Employment

The effect of fertility on women's skilled employment is given in table 3. A quick gloss over the net results under panel 1 indicates that in the initial period of study, fertility was significantly related to women's chances of securing skilled employment in a few countries across the regimes (Tanzania, Benin, Mali, Cote d'Ivoire and Nigeria) where mothers were less likely than non-mothers to access this sector. In the remaining study countries, fertility was unrelated to women's skilled employment behavior in the early 1990s. Panel 2 in the same table reports the recent estimates of the relationship between fertility and skilled labor force participation as measured by the second study. Shifting focus to these recent skilled sector associations, one finds the effect of fertility to be, unexpectedly, small in size in all but a handful of countries, irrespective of the presence of correlates and regime. Fertility impedes women's likelihood of engaging in skilled work in Benin and Senegal under the HFHE regime and in Cote d'Ivoire under the LFHE regime. But that's about it. In the remaining study sample, mothers are no less disadvantaged than non-mothers in accessing skilled work.

To sum up, the effect of fertility on skilled employment, especially in recent times is largely non-existent, being not only very small in size but also non-significant, statistically. This generalization holds across the board. As the fertility transition advances in the fourth regime, the net effect becomes undeniably small. Transcending country stage in the fertility employment continuum, there appears to be a geographic effect: all the few cases where fertility hinders women's skilled work opportunities in more recent times are located in the West African sub-region. Further, the role of correlates on the fertility and skilled employment relationship has become more marked in contemporary times to the point that it considerably reduces the disadvantage faced by mothers relative to non-mothers in earlier times. The decline in the relative edge of non-mothers can be plausibly stem from the economic structural adjustments (Eloundou-Enyegue 1997) that have been reported to favor men over women in general (Beneria and Feldman 1992) rather than stemming from a differential impact of fertility. This explanation becomes even more plausible in the case of Burkina Faso and Chad where unmeasured factors (see model V) which may well include the above economic reforms fully explain the employment differential between mothers and non-mothers.

Finally, an illuminating pattern of evolution emerges through a close scrutiny of the entire results across the two employment sectors: *Over time, as the fertility effect have grown more negative for mothers in terms of their overall sector options, it has in tandem become more positive, albeit its small magnitude, in terms of their access to the more regulated and presumably profitable skilled sector.* Can this be interpreted as cause for optimism for women's economic prospects in the region and declining inequality across children and genders? What do these results hold for the fertility transition in the region? Much cannot be said about these changes because they stem from absolute effects and one cannot interpret with certainty the relative contribution of fertility as opposed to other factors to these changes. A more accurate picture from the decomposition procedure is presented below.

[Table 4 here]

CONTRIBUTION OF FERTILITY TO EMPLOYMENT CHANGES

Tables 4 and 5 present the results of the decomposition exercise within the overall and skilled sectors, respectively, for the 21 countries in the study. The results show a breakdown of the total changes in employment between 1991 and 2005 into three components: 1) changes in the individual fertility effects on employment, 2) changes in the effects of TFR or aggregate fertility levels and 3) changes in the baseline effects. Thus, the results show the relative contribution (in percentage terms) of changes in the individual fertility effect (i.e., the effect of changes in individual fertility or family size on employment behavior) versus the effect of fertility transition or changes in country-specific factors other than fertility and not included in the analyses, inferred from the baseline.

Concentrating on the top left-hand side of table 4, the decomposition results indicate that women made gains in accessing the overall sector in seven countries (Nigeria, Rwanda, Zimbabwe, Namibia, Mozambique, Niger, and Mali) comprising about 33% of the sampled countries¹². The right-hand side of the top of the table shows the relative contributions of the the above stated components to these changes. Results show that changes in the effect of individual fertility is the main driver of the observed gains in Rwanda, Zimbabwe, and Namibia, where it respectively accounts for 121%, 85% and 138% of the observed gains. Thus, in these countries, mothers rather than non-mothers are driving the gains in the *overall* sector. Given that the overall

¹² Cote d'Ivoire recorded no change and was therefore removed from the list to avoid distortion of the calculations and graphing.

sector more resembles the informal sector, these findings are not inconsistent with the evidence from both the 1987 United Nations study and recent studies (Beguy 2009; Lokshin et al. 2000; Shapiro and Tambashe 1997). Recall that fertility levels have begun to decline in all of the countries in which women have registered gains in overall employment. Yet, although not the major factor, the fertility transition (as reflecting in the contribution of TFR) is gradually beginning to exert some influence on women's overall employment prospects in only two of these countries: Nigeria (20%) and Zimbabwe (34%). Both countries are relatively advanced in their fertility employment transition but it remains to be seen whether factors related to the transition will grow in importance as the transition progresses. Contrastingly, in the remaining countries, the recorded gains are mainly driven by prevailing country-specific processes that govern employment and not factors related to the transition or changing family sizes, accounting for as much as 301%, 215%, 152% and 114% of the gains in Mali, Niger, Nigeria and Mozambique, respectively.

The bottom of table 4 presents countries where women's overall employment has declined during the 15 years under study. Results show reversals in the majority of the sample: Burkina Faso, Kenya, Zambia, Chad, Madagascar, Ghana, Ethiopia, Tanzania, Uganda, Cameroon, Benin, Senegal, and Malawi). The returns to fertility component is the dominant driver of the reversals in only Senegal¹³, Tanzania, Ghana, Uganda and Chad where it explains 811%, 194%, 172%, 84% and 51% of the respective changes. This means that in these countries, increasing fertility is steering women away from participating generally in the overall sector. However, in the majority of the countries recording reversals (Burkina Faso, Kenya, Zambia, Madagascar, Ethiopia, Cameroon, Benin, Malawi), the changes were driven mainly by changes in baseline effects, implying that the retreat of mothers from any paid work is not because of their fertility but because of underlying country-specific factors.

Shifting focus to the more regulated skilled sector, (table 5), clear-cut differences emerge between the overall and this sector. Nine countries (Benin, Tanzania, Namibia, Chad, Cameroon, Burkina Faso, and Cote d'Ivoire) recorded gains in women's skilled employment as opposed to three countries recording gains in overall employment (top right-hand side of table 5). Changes in the effect of fertility on individual employment are the dominant force behind the gains in *only* Malawi and Ghana, accounting for 69% and 82% of the respective gains. In the remaining seven

¹³ Note that the magnitude of the reversals are miniscule, which explains the huge percentages.

countries, changes in the baseline component are driving the gains. *Said differently, neither the fertility transition nor changes in individual fertility is behind the recorded gains in women's skilled work in much of the region over the 15-year study period.*

[Table 5 here]

With respect to reversals in the skilled sector (bottom of table 5), more countries, twelve in all, registered declines in women's skilled employment in the region as a whole. Changes in individual fertility effects turn out to be driving the reversals in Senegal, Niger and to a lesser extent in Rwanda, Uganda and Mali, implying that fertility or family size are causing women to retreat from this presumably more economically secure sector. In the case of Nigeria, the retreat is associated with macro-level fertility effects. This is unsurprising given that fertility rates have increased in the country during the 15 years of study. In the remaining countries (Kenya, Zimbabwe, Ethiopia, Madagascar, Mozambique, and Zambia), baseline effect changes is driving the observed reversals, indicating that women's retreat from the skilled labor force in these countries cannot be attributed to changes in macro-level fertility effects nor fertility effects at the individual level. Again as noted for overall employment, these baseline-related processes can be tied generalized decline in the economy and its consequential increase in women's reservation to work garnered from qualitative data (Jah 2011), trading quality for quantity (Eloundou-Enyegue 1997; Eloundou-Enyegue and DaVanzo 1997) and the impacts of structural adjustments and privatization (Beneria and Feldman 1992).

CONCLUSIONS AND POLICY IMPLICATIONS

Developing countries, sub-Saharan Africa included have experienced an expansion in female schooling, accompanied by declines in demographic behavior, specifically marriage and fertility. Focusing on the question posed in this paper, lower fertility is expected to boost women's employment prospects. Women's increased employment, in turn, is expected to foster further fertility decline, through competition for mother's time, greater use of contraception, greater likelihood of trading quantity for quality, or women's enhanced leverage in family planning decisions. Yet evidence on the impact of fertility on employment remains spotty in sub-Saharan Africa. The purpose of this research is to help fill this void. Building on recent fertility changes within countries and exploiting the continued availability of comparable DHS data, the study attempts a large-scale historical and multi-method analysis and controlled for several correlates

to provide an early assessment of the effect of the insipient fertility transition on women's employment in the region, and to test the work fertility incompatibility thesis. To evaluate the prospects for a sustained fertility transition in the region, the study quantifies, through decomposition exercise, the relative contribution of changes in individual fertility versus the fertility transition (inferred from macro level fertility rates or TFR) or changes in country-specific processes to the observed changes in women's employment between 1991 and 2005.

As judged by the multivariate analysis, the overall results generally show no direct relationship between the fertility transition and women's employment behavior. The multivariate evidence reveals that the effect of fertility has been nil in countries undergoing a transition as well as in countries where fertility rates have risen. Similarly, rates have been positive in some instances and negative in others in countries where the transition has begun and also in countries where fertility is rising. Conversely, results highlight substantial variation across occupation sectors, countries and study period in the effect of individual fertility on women's likelihood of employment. In terms of the overall sector and in the early 1990s, fertility or family size had no impact on women's employment behavior in all countries studied except in three countries: Zambia and Nigeria where the impact was positive and in Zimbabwe, where the impact was negative. Note that in Nigeria fertility rates have increased and stalled at 5.7 in recent times from a lower rate of 4.7 in 1997 while rates have declined in the other two countries during the study. However and based on the second study, the effect of fertility on women's work lives have grown significantly over time in this overall sector where it impacts employment negatively in 10 of the 16 countries with evidence from the multivariate analysis.

Within, the skilled sector, the reverse is quite discernible. In earlier period of the 1990s, while fertility was unrelated to women's employment in the majority of countries, it hindered employment 5 countries. With time, however, the fertility effect has become unrelated to employment behavior except in three where the effect on skilled employment is negative. The incompatibility thesis (Stycos and Weller 1967), judged by the skilled sector multivariate results where conflict is most likely to occur, is unsupported in the majority of the study sample with results. The thesis is supported only in Benin and Cote d'Ivoire (both study periods) and Tanzania, Mali and Ghana (initial study period) and in Senegal (second study period). This finding for Senegal is inconsistent with the results in Beguy's 2009 study who find fertility to be unrelated to women's employment in Dakar. The inconsistency can be due to both differences in

data (Beguy analyzed an event history data while this study analyzed historical data constructed from cross-sectional data) and sample (Beguy's study sample is drawn from the capital city, Dakar while the sample analyzed here is nationally representative).

What is the driving force behind the differential impact of fertility on women's employment summarized above? Is it individual level fertility or the fertility transition per se or is it broad processes of social change? While the multivariate results are in themselves absolute and cannot be relied on for relative effects, the decomposition analyses can. Based on the decomposition results, the transition appears to have some influence on overall employment changes only in three countries where it is not even the dominant driver of these changes. With respect to skilled employment, it is only in Nigeria that the transition fully accounts for the employment decline recorded during the two study periods. While *prima facie*, this latter finding appears intriguing since Nigeria's has clearly not entered a sustained fertility transition, it is quite plausible, implying that high fertility rates is driving women away from the skilled sector. Thus, on the whole, the fertility transition by itself may be helpful but clearly not very critical at this point in African women's contemporary employment behavior. Rather, the driving factors in the observed employment changes in the course of the 15-year study lie with the individual fertility effects and country-specific processes of social change, with individual-level fertility exerting more force in overall employment while country-specific processes taking precedence within the skilled sector.

In view of the above findings, the study highlights some policy implications. In agreement with Connelly 1992; Connelly, DeGraff and Levinson 1996 for elsewhere in the developing world, the evidence calls for an integrated strong and acceptable reproductive health programs that include strategies to ensure women's access to secure and profitable employment and the means to advance their careers. Without women's ability to access secure employment and advance in their professions, it would be difficult to sustain the insipient fertility transition in the region. Similarly, enhancing women's social and economic status and reducing the entrenched inequality between and within genders and across families and children would be equally if not more difficult.

The evidence generated in this study was aided by the innovative approach of conducting a multi-method within-country analysis of multiple countries with nationally representative data from the source collected around the same time period, controlling for classic correlates and

distinguishing occupation sectors. The study also innovates in the construction of a historical data set from repeat cross-sectional surveys, with the evidence underlining the importance of historical over cross-sectional analysis. This point is well substantiated by the fact that beyond variation across sectors and countries, the fertility effect can and does vary over time within a country. Thus the study has research implications, urging the continued use of these innovative techniques adopted here should prove valuable in future employment analysis as we strive to understand the complex nexus between fertility, employment and women's and their children's socio-economic well being.

This complex nexus in the relationships leads to the need for understanding what aspects of country specificities constitute the baseline effects which have turned out to be driving the relationships in most countries. To this end, a sequel to this paper will involve a critical examination of the effect of the correlates under the various models. Recent evidence (Jah 2011) suggests that some of the baseline processes may be tied to marriage in young adulthood (women in the ages 15- 25). How both marriage and fertility cohorts across various educational levels influence employment is crucial to our understanding of the future course of the transition and women's economic empowerment and enhanced status and should be pursued in future employment analyses.

Acknowledgements

This research is part of a larger dissertation research and I wish to acknowledge support from the Hewlett Foundation through the Cornell Population and Development Program for this dissertation research. I would also like to acknowledge the Demographic and Health Surveys Program for use of the data in this study. I am thankful to Parfait Eloundou-Enyegue for his insights and useful comments. Finally, I am grateful to the Department of Development Sociology for offering me a post doctorate associate in the Population and Development Program and the opportunity to write this paper. All correspondence should be directed to Fatou Jah, email: fj21@cornell.edu

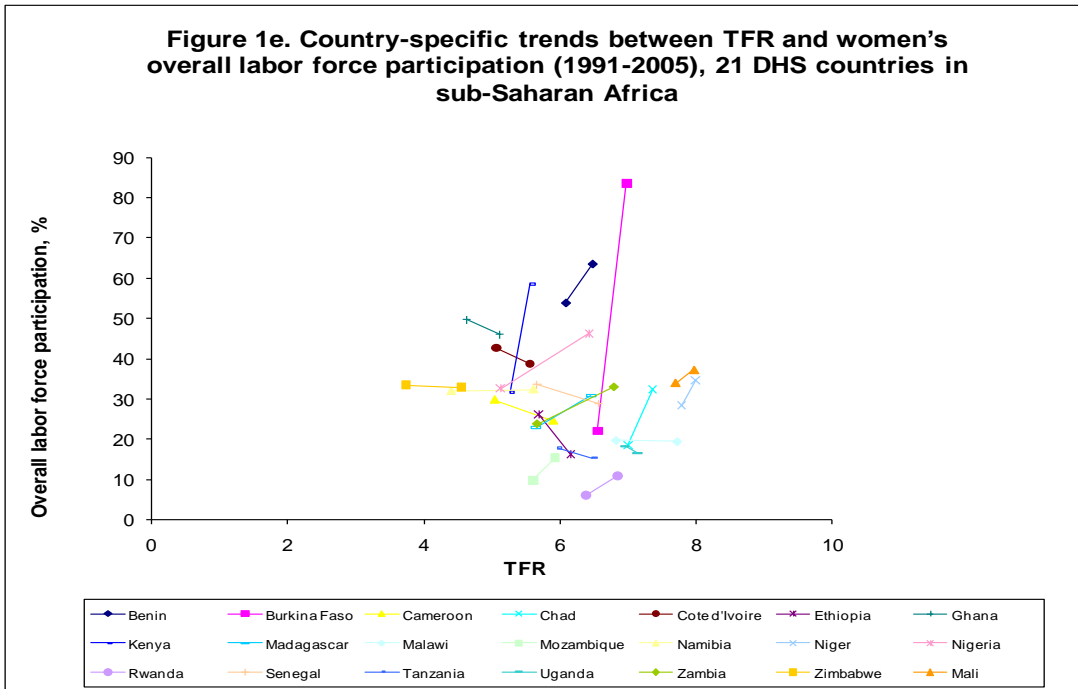
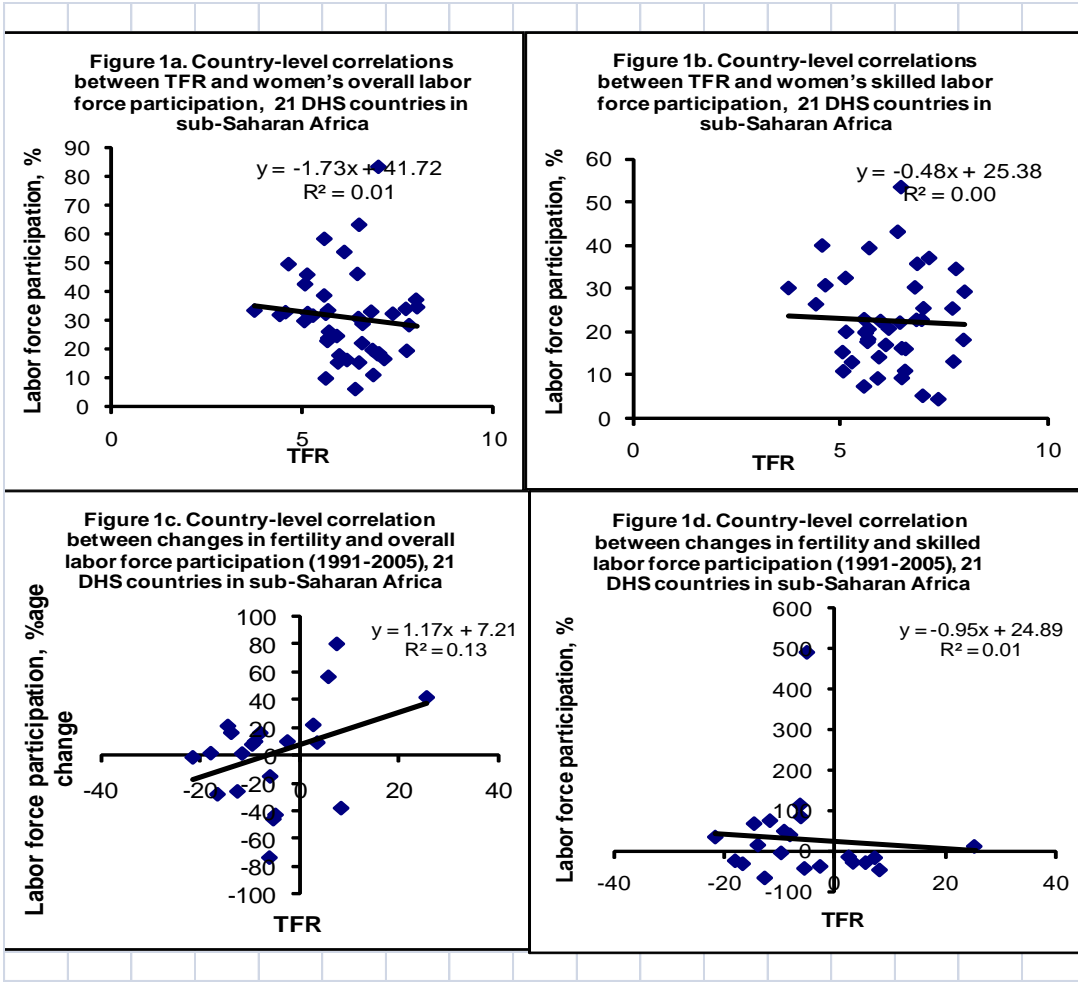


Table 1. Levels and Trends in Total Fertility Rate (TFR), Women's Labor Force Participation and the Bivariate Effect of Fertility on Women's Overall and Skilled Employment in 21 DHS Countries in SSA, 1991-2005

Countries and types	Survey sample		Survey period		Time interval	Panel 1: Fertility		Panel 2: Employment				Panel 3: Bivariate effect of fertility (no. of living children), odds ratios			
	Study [1]	Study [2]	Study [1]	Study [2]		TFR		Overall		Skilled		Overall		Skilled	
						[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[2]
High Fertility - Low Employment Regime															
Burkina Faso	6354	12477	1992	2003	11	6.5	5.9	83.65	22.10	5.11	10.89	0.92	1.07	1.11	1.28
Chad	7454	6085	1996	2004	8	6.4	6.3	32.37	18.53	4.31	25.44	1.15	1.20	1.30	1.14
Madagascar	6260	7949	1992	2004	12	6.1	5.2	30.86	22.88	53.59	17.64	1.10	1.34	1.06	1.23
Malawi	4849	13220	1992	2000	8	6.7	6.3	19.43	19.71	13.06	22.76	1.14	1.28	0.83	1.18
Rwanda	6551	10421	1992	2000	8	6.2	5.8	6.08	10.97	43.22	35.77	0.96	0.69	1.11	0.61
Tanzania	9238	10329	1992	2004	12	6.2	5.7	15.33	17.84	16.15	22.48	1.29	1.06	1.09	0.86
Uganda	7070	7246	1995	2001	6	6.9	6.9	16.58	18.26	37.12	22.77	1.12	1.19	1.10	0.89
Zambia	7060	7658	1992	2002	10	6.5	5.9	33.07	23.84	30.30	20.57	1.51	1.42	0.94	1.12
Sub-sample	54836	75385			9										
Average within type						6.9	6.4	29.04	19.16	25.02	22.01	1.16	1.14	1.08	1.04
High Fertility - High Employment Regime															
Benin	5491	6219	1996	2001	5	6.0	5.6	63.43	53.92	9.22	16.93	1.19	1.49	0.58	0.76
Mali	9704	12849	1996	2001	5	6.7	6.8	34.06	37.26	25.39	18.09	1.02	1.06	1.11	0.90
Niger	6503	7577	1992	1998	6	7.0	7.2	28.38	34.66	34.58	29.29	1.12	1.06	1.04	0.92
Senegal	6310	14602	1993	2005	12	6.6	5.7	28.82	33.57	15.99	18.23	1.06	1.10	0.89	0.87
Sub-sample	28008	41247			7										
Average within type						7.2	6.9	37.32	37.99	22.24	20.02	1.08	1.14	0.94	0.87
Low Fertility - Low Employment Regime															
Cameroon	3871	10656	1991	2004	13	5.8	5.0	24.59	29.83	9.14	15.25	1.33	1.40	1.09	0.86
Ethiopia	15367	14070	1992	1997	5	5.7	6.2	26.09	16.21	39.43	20.71	0.93	1.00	1.18	1.25
Mozambique	8779	12418	1997	2003	6	5.2	5.5	9.79	15.35	19.93	14.07	1.43	1.37	0.89	1.25
Sub-sample	28017	37144			9										
Average within type						5.7	5.8	20.78	19.83	29.13	16.92	1.14	1.24	1.08	1.14
Low Fertility - High Employment Regime															
Cote d'Ivoire	8099	3040	1994	1999	5	5.3	5.2	38.73	42.67	7.28	10.80	1.11	0.96	0.77	0.90
Ghana	9405	5691	1993	2003	10	5.2	4.4	45.99	49.67	32.49	30.79	1.43	1.55	0.82	0.94
Kenya	7540	8195	1993	2003	10	5.4	4.9	58.51	31.71	22.90	12.90	0.88	1.17	1.19	1.38
Namibia	5421	6755	1992	2000	8	5.4	4.2	32.36	31.94	19.71	26.37	1.60	2.24	1.06	1.27
Nigeria	9810	7620	1999	2003	4	4.7	5.7	32.59	46.26	19.96	22.10	2.15	1.63	0.97	0.99
Zimbabwe	6128	5907	1994	1999	5	4.3	4.0	32.91	33.49	40.03	30.15	1.44	1.44	1.58	1.43
Sub-sample	46403	37208			7										
Average within type						5.3	5.0	40.605	38.657	23.386	22.534	1.459	1.541	1.033	1.181
Total Sample	157264	190984													
AVERAGE						6.246	6.122	32.454	27.155	24.775	20.693	1.231	1.236	1.040	1.051

Table 2. Trends in Net Effect of Fertility (no. of Living Children) on Women's Overall Employment, 16 DHS Countries in SSA, 1991-2005

		Overall Employment																				
		Panel 1: Study [1]										Panel 2: Study [2]										
		Logistic regression										Fixed effects		Logistic regression					Fixed effects			
		Survey sample		Survey period		Time span	Basic Controls		Family composition		Economic constraints		Aspirations		Hazard Ratio	Basic Controls		Family composition		Economic constraints		Cultural Attributes
Study [1]	Study [2]	Study [1]	Study [2]	Model 1	Model 2		Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5		Model 1	Model 2	Model 3	Model 4	Model 5	Hazard Ratio	Hazard Sig
High Fertility - Low Employment Regime																						
Burkina Faso	6354	12477	1992	2003	11	0.84	0.92	0.92	0.89	0.90	0.93 ***	0.97	1.00	1.00	1.00							
Chad	7454	6085	1996	2004	8	1.02	1.06	1.04	1.04	1.09	1.01	1.02	1.02	1.00	1.02							
Madagascar	6260	7949	1992	2004	12	0.96	1.03	0.96	0.98	0.97	0.83 ***	0.86 ***	0.90 ***	0.89 ***	0.90 ***							
Tanzania	9238	10329	1992	2004	12	0.91 *	1.00	0.99	0.98	0.98	0.89 ***	0.95 **	0.95 *	0.95 *	0.93 **							
Uganda	7070	7246	1995	2001	6	0.89 ***	1.00	0.94	0.93	0.93	0.87 ***	0.91 ***	0.91 ***	0.91 ***	0.91 ***							
Zambia	7060	7658	1992	2002	10	1.05	1.13 ***	1.11 *	1.11 *	1.16 ***	0.93 ***	0.96 *	0.97	0.96	0.97							
Sub-sample	43436	51744																				
Average within type						0.95	1.02	1.00	0.99	1.01	0.91	0.95	0.96	0.96	0.96							
High Fertility - High Employment Regime																						
Benin	5491	6219	1996	2001	5	0.87 **	0.91	0.85 **	0.85 **	0.89	0.85 ***	0.87 ***	0.92 ***	0.92 ***	0.93 **							
Mali	9704	12849	1996	2001	5	0.93 *	1.02	0.99	1.01	1.00	0.95 ***	0.96 ***	0.96 ***	0.96 ***	1.00							
Niger	6503	7577	1992	1998	6	1.00	1.06	1.05	1.04	1.03	1.05 ***	1.05 ***	1.05 ***	1.03	1.02							
Senegal	6310	14602	1993	2005	12	0.85 ***	0.97	0.94	0.92	0.97	0.95 ***	0.98	0.99	0.99	0.97 *							
	28008	41247																				
Average within type						0.91	1.00	0.97	0.97	0.98	0.95	0.97	0.98	0.98	0.98							
Low Fertility - Low Employment Regime																						
Cameroon	3871	10656	1991	2004	13	0.96	1.01	0.99	0.97	0.99	0.93 ***	0.96 **	0.96 **	0.96 ***	0.95 **							
Mozambique	8779	12418	1997	2003	6	0.97	1.07	1.02	1.07	1.13	0.96 *	0.96 **	0.95 **	0.95 **	0.95 **							
Sub-sample	12650	23074			10																	
Average within type						0.96	1.05	1.01	1.04	1.08	0.95	0.96	0.96	0.95	0.95							
Low Fertility - High Employment Regime																						
Cote d'Ivoire	8099	3040	1994	1999	5	0.91 **	1.05	1.01	1.00	1.03	0.91 ***	0.94 *	0.94 *	0.92 **	0.93 *							
Ghana	9405	5691	1993	2003	10	1.02	1.18 ***	1.03	1.02	1.03	0.76 ***	0.81 ***	0.82 ***	0.82 ***	0.83 ***							
Nigeria	9810	7620	1999	2003	4	1.23 ***	1.27 ***	1.12 **	1.15 **	1.18 **	0.99	0.99	0.98	0.98	1.00							
Zimbabwe	6128	5907	1994	1999	5	0.83 ***	0.89 **	0.88 **	0.87 **	0.89 *	0.91 ***	0.94 ***	0.94 **	0.94 **	0.92 ***							
Sub-sample	33442	22258			6																	
Average within type						1.02	1.12	1.02	1.03	1.05	0.90	0.92	0.92	0.92	0.93							
Total Sample	117536	95851																				
AVERAGE						0.96	1.05	1.00	1.00	1.02	0.93	0.95	0.96	0.96	0.96							
INEQUALITY						0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00							

***, **, *, and # indicate significance at the <0.001, 0.01, 0.05, and 0.10 levels, respectively.

Table 3. Trends in Net Effect of Fertility (no. of Living Children) on Women's Skilled Employment, 16 DHS Countries in SSA, 1991-2005

		Skilled Employment																						
		Panel 1: Study [1]										Panel 2: Study [2]												
		Logistic regression										Fixed effects												
		Basic Controls					Family composition					Economic constraints					Cultural Attributes							
		Model 1		Model 2		Model 3		Model 4		Model 5		Model 1		Model 2		Model 3		Model 4		Model 5				
Countries and types	Study [1]	Study [2]	Study [1]	Study [2]	Time span	Odds Ratio	Odds Sig	Odds Ratio	Odds Sig	Odds Ratio	Odds Sig	Odds Ratio	Odds Sig	Odds Ratio	Odds Sig	Hazard Ratio	Hazard Sig	Odds Ratio	Odds Sig	Odds Ratio	Odds Sig	Hazard Ratio	Hazard Sig	
	High Fertility - Low Employment Regime																							
Burkina Faso	6354	12477	1992	2003	11	1.14		1.06		1.02		1.02		1.21		0.94		0.90 **		0.90 **		0.90 *		0.94
Chad	7454	6085	1996	2004	8	0.99		0.93		0.94		0.93		1.02		1.06		1.07		1.07		1.08 *		1.07
Madagascar	6260	7949	1992	2004	12	0.96		0.95		0.97		0.97		0.97		1.04		1.03		1.01		1.01		1.00
Tanzania	9238	10329	1992	2004	12	0.70 **		0.66 ***		0.59 ***		0.59 ***		0.43 ***		0.99		0.96		0.96		0.95		0.92
Uganda	7070	7246	1995	2001	6	1.06		0.99		0.98		0.97		0.97		0.99		0.98		0.97		0.97		0.95
Zambia	7060	7658	1992	2002	10	0.86 *		0.84 **		0.83 **		0.82 **		0.88		0.96		0.94		0.94		0.95		0.92
Sub-sample	43436	51744			10																			
	Average within type					0.94		0.89		0.87		0.87		0.88		0.99		0.97		0.96		0.97		0.96
High Fertility - High Employment Regime																								
Benin	5491	6219	1996	2001	5	0.59 ***		0.65 ***		0.61 ***		0.58 ***		0.57 ***		0.85 ***		0.84 ***		0.84 ***		0.82 ***		0.80 ***
Mali	9704	12849	1996	2001	5	0.98		0.94		0.94		0.94		0.83 *		0.97		0.98		0.97		0.98		0.97
Niger	6503	7577	1992	1998	6	1.08		1.13		1.15		1.13		1.06		0.97		1.00		1.01		1.05		1.00
Senegal	6310	14602	1993	2005	12	0.82 *		0.80 *		0.82 *		0.82 *		0.82		0.85 ***		0.85 ***		0.85 ***		0.85 ***		0.84 ***
Sub-sample	28008	41247			7																			
	Average within type					0.89		0.90		0.90		0.89		0.83		0.91		0.91		0.92		0.92		0.90
Low Fertility - Low Employment Regime																								
Cameroon	3871	10656	1991	2004	13	1.12		1.18		1.16		1.17		1.04		0.96		0.95		0.95		0.95		0.93
Mozambique	8779	12418	1997	2003	6	0.97		0.96		0.93		0.93		0.91		1.00		1.00		1.00		1.00		0.91
Sub-sample	12650	23074			10																			
	Average within type					1.01		1.03		1.00		1.01		0.95		0.98		0.98		0.97		0.98		0.92
Low Fertility - High Employment Regime																								
Cote d'Ivoire	8099	3040	1994	1999	5	0.79 *		0.78 *		0.80 *		0.78 *		0.76 *		0.87 *		0.87 *		0.87 *		0.86 *		0.86 *
Ghana	9405	5691	1993	2003	10	0.82 ***		0.77 ***		0.80 ***		0.78 ***		0.75 ***		1.00		0.98		0.97		0.97		0.95
Nigeria	9810	7620	1999	2003	4	0.93 ***		0.92		0.95		0.94		0.82		0.99		0.99		0.98		1.00		0.96
Zimbabwe	6128	5907	1994	1999	5	1.09		1.02		1.03		1.04		1.01		1.01		1.02		1.01		1.03		1.03
Sub-sample	33442	22258			6																			
	Average within type					0.89		0.86		0.88		0.88		0.82		0.98		0.98		0.97		0.98		0.96
Total Sample	117536	95851																						
	AVERAGE					0.92		0.90		0.89		0.89		0.86		0.96		0.95		0.95		0.96		0.94
	INEQUALITY					0.02		0.02		0.03		0.03		0.05		0.00		0.00		0.00		0.00		0.00

***, **, *, and # indicate significance at the <0.001, 0.01, 0.05, and 0.10 levels, respectively.

TABLE 4. RELATIVE CONTRIBUTION OF FERTILITY TO CHANGES IN WOMEN'S OVERALL EMPLOYMENT IN 21 DHS COUNTRIES IN SSA, 1991-2005

							Predicted Employment (logits) in the Overall Sector					
Sample size				Study period			Percent of total change associated with					
Countries and types	Study [1]	Study [2]	Average sample	Study [1]	Study [2]	Time span	Study [1]	Study [2]	Total change	Baseline	Average education	Returns to fertility: no of living children
GAINS IN EMPLOYMENT												
High Fertility - High Employment Regime												
Mali	9704	12849	11276.5	1996	2001	5	-1.12	-1.06	0.06	301%	-38%	-163%
Niger	6503	7577	7040	1992	1998	6	-0.73	-0.67	0.07	215%	-2%	-113%
Low Fertility - Low Employment Regime												
Mozambique	8779	12418	10599	1997	2003	6	-3.14	-2.94	0.20	114%	-6%	-9%
Low Fertility - High Employment Regime												
Nigeria	9810	7620	8715	1999	2003	4	-1.12	-0.17	0.95	152%	20%	-72%
Rwanda	6551	10421	8486	1992	2000	8	-3.83	-3.37	0.46	-3%	-18%	121%
Zimbabwe	6128	5907	6018	1994	1999	5	-2.31	-1.95	0.36	-19%	34%	85%
Namibia	5421	6755	6088	1992	2000	8	-1.49	-1.17	0.31	-12%	-25%	138%
Cote d'Ivoire	8099	3040	5570	1994	1999		-0.79	-0.79	0.001	NA	NA	NA
REVERSALS IN EMPLOYMENT												
High Fertility - Low Employment Regime												
Burkina Faso	6354	12477	9416	1992	2003	11	0.89	-3.06	-3.94	113%	-1%	-11%
Chad	7454	6085	6770	1996	2004	8	-0.63	-1.91	-1.28	50%	-1%	51%
Madagascar	6260	7949	7105	1992	2004	12	-1.23	-2.20	-0.98	73%	-6%	33%
Malawi	4849	13220	9035	1992	2000	8	-1.84	-1.87	-0.03	333%	-28%	-205%
Tanzania	9238	10329	9784	1992	2004	12	-3.00	-3.59	-0.59	-78%	-16%	194%
Uganda	7070	7246	7158	1995	2001	6	-2.53	-2.94	-0.41	22%	-6%	84%
Zambia	7060	7658	7359	1992	2002	10	-1.21	-2.57	-1.35	52%	0%	47%
High Fertility - High Employment Regime												
Benin	5491	6219	5855	1996	2001	13	-0.28	-0.54	-0.26	136%	-21%	-16%
Senegal	6310	14602	10456	1993	2005	12	-1.88	-1.93	-0.05	-378%	-333%	811%
Low Fertility - Low Employment Regime												
Cameroon	3871	10656	7264	1991	2004	13	-1.58	-1.87	-0.29	139%	-11%	-27%
Ethiopia	15367	14070	14719	1992	1997	5	-2.39	-3.20	-0.81	63%	20%	18%
Low Fertility - High Employment Regime												
Ghana	9405	5691	7548	1993	2003	10	-0.70	-1.55	-0.85	-65%	-7%	172%
Kenya	7540	8195	7868	1993	2003	10	-1.03	-2.77	-1.74	56%	-5%	50%

TABLE 5. RELATIVE CONTRIBUTION OF FERTILITY TO CHANGES IN WOMEN'S SKILLED EMPLOYMENT IN 21 DHS COUNTRIES IN SSA, 1991-2005

Predicted Employment (logits) in the Skilled Sector												
Countries and types	Sample size			Study period			Percent of total change associated with					
	Study [1]	Study [2]	Average sample	Study [1]	Study [2]	Time span	Study [1]	Study [2]	Total change	Baseline	Total fertility rate (TFR)	Returns to fertility: no of living children
GAINS IN EMPLOYMENT												
<u>High Fertility - Low Employment Regime</u>												
Burkina Faso	6354	12477	9416	1992	2003	11	-3.09	-1.85	1.24	192%	-2%	-91%
Chad	7454	6085	6770	1996	2004	8	-3.20	-0.27	2.93	60%	-1%	41%
Malawi	4849	13220	9035	1992	2000	8	-4.60	-0.96	3.64	29%	2%	69%
Tanzania	9238	10329	9784	1992	2004	12	-6.95	-2.75	4.19	70%	3%	27%
<u>High Fertility - High Employment Regime</u>												
Benin	5491	6219	5855	1996	2001	13	-59.29	-3.62	55.67	98%	0%	2%
<u>Low Fertility - Low Employment Regime</u>												
Cameroon	3871	10656	7264	1991	2004	13	-5.03	-2.94	2.09	160%	0%	-60%
<u>Low Fertility - High Employment Regime</u>												
Namibia	5421	6755	6088	1992	2000	8	-6.03	-2.72	3.31	56%	1%	43%
Ghana	9405	5691	7548	1993	2003	10	-1.35	-0.43	0.92	12%	6%	82%
Cote d'Ivoire	8099	3040	5570	1994	1999	5	-4.44	-3.62	0.83	64%	13%	23%
REVERSALS IN RETURNS												
<u>High Fertility - Low Employment Regime</u>												
Madagascar	6260	7949	7105	1992	2004	12	-0.43	-2.00	-1.57	128%	0%	-28%
Rwanda	6551	10421	8486	1992	2000	8	-0.98	-4.98	-4.00	48%	2%	51%
Zambia	7060	7658	7359	1992	2002	10	-1.31	-1.42	-0.11	1352%	-48%	-1203%
Uganda	7070	7246	7158	1995	2001		-0.45	-3.46	-3.01	47%	0%	54%
<u>High Fertility - High Employment Regime</u>												
Mali	7070	7246	7158	1996	2001	6	-1.33	-2.44	-1.11	46%	1%	53%
Niger	6503	7577	7040	1992	1998	6	-0.34	-2.19	-1.85	-14%	1%	113%
Senegal	6310	14602	10456	1993	2005	12	-3.00	-3.17	-0.16	13%	-128%	215%
<u>Low Fertility - Low Employment Regime</u>												
Ethiopia	15367	14070	14719	1992	1997	5	0.17	-1.57	-1.74	68%	-4%	36%
Mozambique	8779	12418	10599	1997	2003	6	-2.71	-3.14	-0.42	167%	0%	-67%
<u>Low Fertility - High Employment Regime</u>												
Kenya	7540	8195	7868	1993	2003	10	-2.62	-9.34	-6.72	107%	0%	-7%
Nigeria	9810	7620	8715	1999	2003	4	-2.14	-2.18	-0.04	8%	251%	-160%
Zimbabwe	6128	5907	6018	1994	1999	5	-0.79	-2.66	-1.87	59%	0%	41%

REFERENCES

- Allison, P.D. 1996. *Survival Analysis Using the SAS System: A Practical Guide*, Cary, NC: SAS Institute Inc.
- Axinn, W.G., and A. Thornton 1992. "The Relationship Between Cohabitation and Divorce: Selectivity or Causal Influence?" *Demography* 29(3):357-374.
- Becker, G.S. 1981. *A Treatise on the Family*. Cambridge, MA: Harvard University Press.
- Becker, G. 1992. "Fertility and the Economy." *Journal of Population Economics* 5:185-201.
- Beneria, L. and S. Feldman (eds.). 1992. *Unequal Burden: Economic Crises, Persistent Poverty, and Women's Work*. Boulder: Westview Press.
- Bongaarts, J. 2006. "The Causes of Stalling Fertility Transitions." *Studies in Family Planning* 37(1):1-16.
- Boserup, E. 1970. *Women's Role in Economic Development*, London: George Allen and Unwin.
- Brewster, K.L. and R.R. Rindfuss 2000. "Fertility and Women's Employment in Industrialized Nations." *Annual Review of Sociology* 26:271-296.
- Caldwell, J.C. 1980. "Mass Education as a Determinant of the Timing of Fertility Decline." *Population and Development Review* 6(2):225-255.
- Caldwell, J. C. 1982. *Theory of Fertility Decline*. London: Academic Press.
- Caldwell, J.C. and P. Caldwell. 1987. "The Cultural Context of High Fertility in Sub-Saharan Africa." *Population and Development Review* 13(3):409-437.
- Connelly, R. 1992. "Self-Employment and Providing Child Care." *Demography* 29:17-29.
- Connelly, R. D. DeGraff, and D. Levinson. 1996. "Women's Employment and Child Care in Brazil." *Economic Development and Cultural Change* 44:619-656.
- Cramer, J.C. 1980. "Fertility and Female Employment: Problems of Causal Directions." *American Sociological Review* 45(2): 167-190.
- Demographic and Health Surveys (DHS). 2007. Statcompiler, ORC Macro. Available online at: [http:// www.statcompiler.com](http://www.statcompiler.com) accessed January 2007; 2008.
- Desai, S. and L.J. Waite. 1991. "Women's Employment During Pregnancy and After the First Birth: Occupational Characteristics and Work Commitment." *American Sociological Review* 56: 551-66.

- Eloundou-Enyegue, P.M. 2011. "Effects of Fertility Transitions on Schooling in Sub-Saharan Africa: From Micro-level to Aggregate Effects." Presented at the PRB's Fifth Annual PopPov Conference on its Fifth Annual PopPov Conference on Population, Reproductive Health, and Economic Development in France, January 2011.
- Eloundou-Enyegue, P.M. 1997. Demographic Responses to Economic Crisis in Cameroon: Fertility, Child Schooling and The Quantity Quality Tradeoff. PhD Thesis. The Pennsylvania State University.
- Eloundou-Enyegue, P.M. and A.E. Calves. 2006. "Till Marriage Do Us Part: The Family Returns to Female Education in Cameroon." *Comparative Education Research* 50(1):1-20.
- Eloundou-Enyegue, P. M. and DaVanzo, J. 1997 . "Economic Downturns, Structural Adjustrnt Programs, and Child Schooling in Africa: The End of Long Crayons." MND Corporation, 1700 Main Street, Santa Monica, CA 90401.
- Goldin, C. 1995. "The U-Shaped Female Labor Force Function in Economic Development and Economic History." Pp. 61–90 in T.P. Schultz (ed.) *Investment in Women's Human Capital*. Chicago: University of Chicago Press
- Gurak, D.T and M.M. Kritz. 1982. "Female Employment and Fertility in the Dominican Republic: a Dynamic Perspective." *American Sociological Review* 47(6):810-818.
- Gurak, D.T. and M.M. Kritz. 1996. "Social Context, Household Composition and Employment Among Migrant and Non-migrant Dominican Women". *International Migration Review* 30: 399-422.
- Jah, F. 2007. "Learning to Labor: What Happens to African Women's Employment in the Course of Educational Transitions, 1991-2005" *The Current* 10(2):29-48. Published by Public Policy Journal of the Cornell Institute for Public Affairs.
- Klerman, J.A. and A. Leibowitz. 1999. "Job Continuity Among New Mothers." *Demography* 36:145-155.
- Kogel, T. 2004. "Did the Association Between Fertility and Female Employment within OECD Countries Really Change its Sign?" *Journal of Population Economics* 17(1):45-65.
- Kravdal, K. 1992. "Foregone Labor Participation and Earning Due to Childbearing Among Norwegian Women." *Demography* 29(4):545-563.
- Kritz, M.M. and P. Makinwa-Adebusoye. 1997. "Ethnicity, Work, and Family as Determinants of Women's decision-making Autonomy in Nigeria." Population and Development Program. Cornell University Working paper Series No. 97.06. Ithaca, New York.
- Lloyd, C.B. 1991. "The Contribution of the World Fertility Surveys to an Understanding of the Relationship between Women's Work and Fertility. *Studies in Family Planning* 22(3):141-161.

Lloyd, C.B. P.C. Hewett. 2003. "Primary Schooling in sub-Saharan Africa: Recent Trends and Current Challenges." Policy Research Division Working Paper No. 176. The Population Council, New York.

Lokskin, M.M., E. Glinskaya, and M. Garcia. 2000. "The Effect of Early Childhood Development Programs on Women's Labor Force Participation and Older Children's Schooling in Kenya." World Bank Policy Research Working Paper 2376. Development Working Group. DC: The World Bank.

Mason, K.O. and V.T. Palan, 1981. "Female Employment and Fertility in Peninsular Malaysia: The Maternal Role Incompatibility Hypothesis Reconsidered," *Demography* 18(4):549-575.

Mincer, J. 1974. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research.

Moffitt, R. 2005. "Causal Analysis Relationships in Population Research." *Demography* 42(1):91-108.

Moffitt, R. 2003. "Causal Analysis in Population Research: An Economist's Perspective." *Population and Development Review* 29(3):448-458.

National Academy of Sciences. 2005. *Growing Up Global: The Changing Transitions to Adulthood in Developing Countries*. Washington, DC.

Presser, H.B. 1989. "Can We make Time for Children? The Economy, Work Schedules, and Child Care." *Demography* 26:253-254.

Rindfuss, R.R., and K.L. Brewster. 1996. "Childrearing and Fertility." *Population and Development Review* 22(Suppl.):297-324.

Robinson, W.S. 1950. "Ecological Correlations and the Behavior of Individuals." *American Sociological Review* 15: 351-57.

Schockaert, I. 2005. "Women's Employment and Fertility in Latin America. A Review of the Question." *Population* 60 (1-2):149-168.

Shapiro, D. and O. Tambashe. 1997. "Education, Employment, and Fertility in Kinshasa and Prospects for Changes in Reproductive Behavior." [*Population Research and Policy Review* 16 \(3\):259-287.](#)

Spitze, G. 1988. "Women's Employment and Family Relations." *Journal of Marriage and Family* 50:595-668.

Standing, G. 1983. "Women's Work Activity and Fertility." Pp. 517-546 in Bulatao, R.A. and R.D. Lee (eds.). *Determinants of fertility in developing countries*. New York: Academic Press.

- Stokes, C.S. and Y.S. Hsieh. 1983. "Female Employment and reproductive Behavior in Taiwan, 1980." *Demography* 20(3):313-331.
- Stromquist N. P. 1990. "Women and Illiteracy: The Interplay of Gender, Subordination and Poverty." *Comparative Education Review* 34 (1):95-111.
- Stycos, J.M. and R.H. Weller. 1967. "Female Working Roles and Fertility." *Demography* 4:210-217.
- Thornton, A. 2001. "The Development Paradigm, Reading History Sideways, and Family Change." *Demography* 38:449-465.
- UNFPA. 2002. *State of World Population 2002. People, Poverty, and Possibilities*. United Nations Population Fund, New York, U.S.A. URL: <http://www.unfpa.org>.
- UNICEF 2003. *The State of the World's Children 2004. Girls, Education and Development*. United Nations Children's Fund (UNICEF). Available online at: www.unicef.org.
- United Nations. 1987. "Women's Employment and Fertility: A Comparative Analysis of Fertility Survey Data for 38 Developing Countries." United Nations, New York.
- United Nations 2000. *United Nations Millennium Declaration* [on line]. Available at <http://www.un.org/millenniumgoals>. Accessed May 2007
- United Nations. 2003. *World Population Monitoring: Population, Education and Development*. New York: United Nations.
- United Nations. 2005. *The Millennium Development Goals Report*. Available online at <http://www.un.org/millenniumgoals>. Accessed May 2007.
- Van de Walle, E. and A. Forster. 1990. *Fertility Decline in Africa: Assessment and Prospects*. Washington, DC: World Bank.
- Westoff, C.F. 2003. *Trends in Marriage and Early Childbearing in Developing Countries*. DHS Comparative Reports No. 5. Calverton, MD: ORC Macro.
- Westoff, C.F. 1992. *Fertility Decline in Africa*. Washington, DC: World Bank.
- World Bank. 2007. *World Development Indicators*. Available online at <http://devdata.worldbank.org>. Accessed 2007.
- Wong, R. and R. Levine. 1992. "The Effect of Household Structure on Women's Economic Activity and Fertility: Evidence from Recent Mothers in Urban Mexico." *Economic Development and Cultural Change* 41(4):89-102.

World Bank. 2001. *“Engendering Development: Through Gender Equality in Rights, Resources, and Voice.”* World Bank Policy Research Report. Washington, DC: The World Bank.